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ELECTRIC RAILWAY JOURNAL

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Westinghouse Electric & Manufacturing Co.
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W WESTINGHOUSE ELECTRIC

Train Operation in City Service



No, 510, Thirty-five H.P. Motor

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

Westinghouse

Vol. 61, *No.* 18 New York, May 5, 1923 *Pages* 749-788

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The cars are particularly luxurious in their furnishings. Particular attention has been given to reducing noise and vibration. Wheels are shrouded and window openings reduced in size.

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By R. B. GENEST.
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Zone Fares and Transferable Short-Ride Weekly Cards for Berlin 760

Signaling on the Frankford Elevated—II 761
By J. N. DODD.
The interlocking features are taken up in this article, as well as the speed control signals which form a special feature of the installation. Junction with the Market Street line involved unusual problems.

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Consult the Index

"In a recent issue there was an article on straightening surface bent street railway rails. Won't you please send copy of this and any other articles you have in reference to this subject. Please send as soon as possible as we are in great hurry for same."
——Public Service Company.

THE above telegram is typical of a great host of inquiries that come to the JOURNAL editors from readers. It prompts two comments.

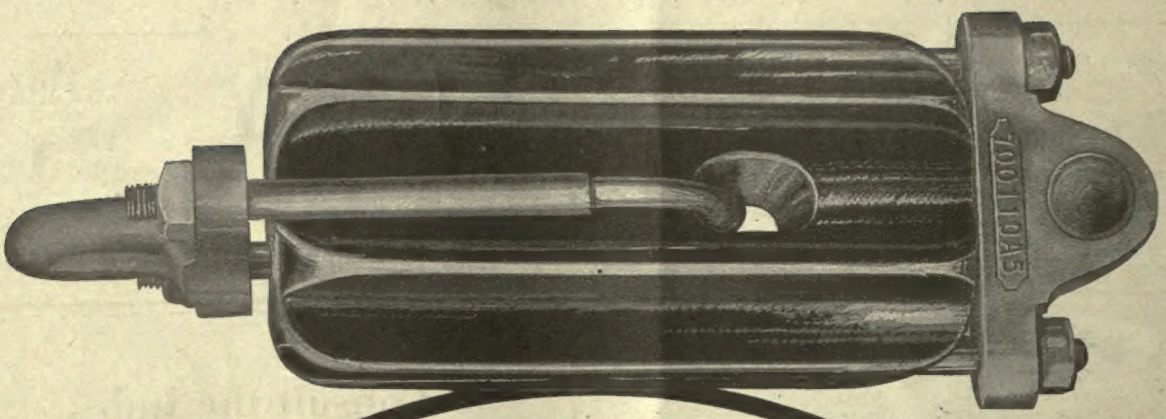
First, it suggests the importance of preserving your copies of the JOURNAL so that the information may be available to refer back to as occasion arises for its use. On almost any problem that comes up, the back issues will reveal helpful data and information.

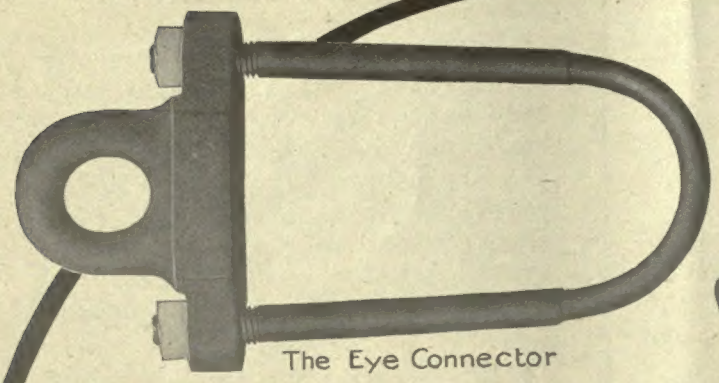
Second, the matter published is carefully indexed twice a year so that there may be bound in each six months' volume a ready means of finding the subject matter desired. These indexes are published in the last issues of June and December. In addition, a brief index of articles by titles is published on the first inside page of each issue—adjacent to this column.

The editors are always glad and willing to give constructive help, and also, if necessary, hunt through several years' back indexes in order to find a certain article or the various references on a certain subject. But we believe it would be much more helpful if the readers were not compelled to wait the time that must necessarily elapse while their requests travel to New York by mail or wire and the replies return. Why not have at hand and consult the same indexes that we use in order to find the information you request? We would feel lost without our indexes, and the numerous requests received each week from our readers prove how indispensable these indexes are when information is needed and needed at once.

Circulation of this issue, 6,000

Advertising Index—Alphabetical, 58; Classified, 54, 56; Searchlight Section, 53

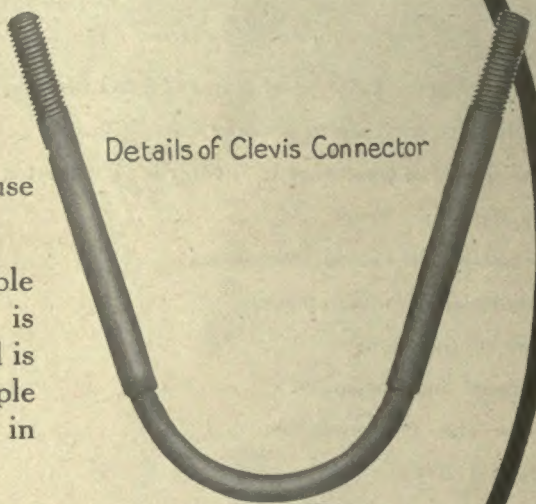




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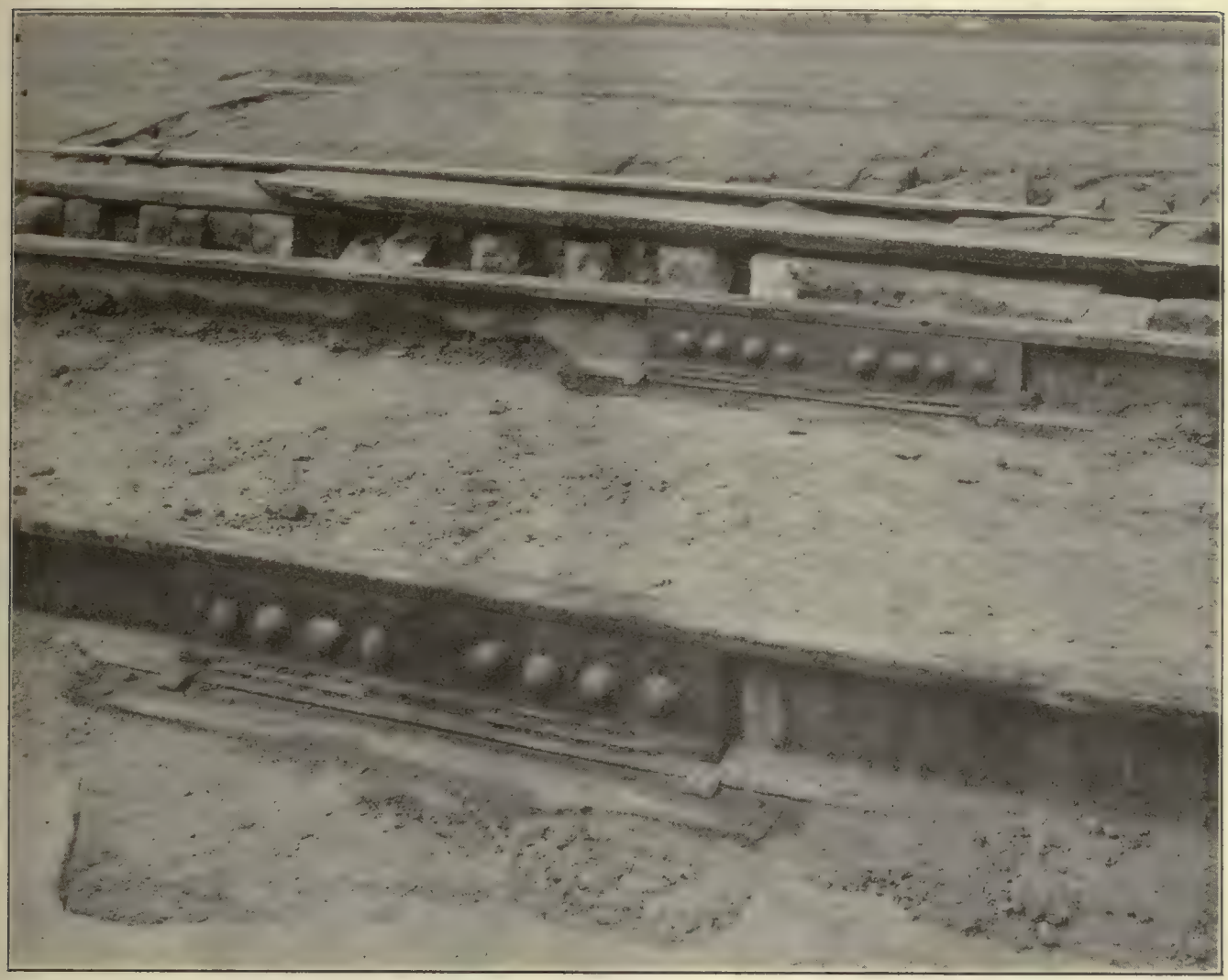
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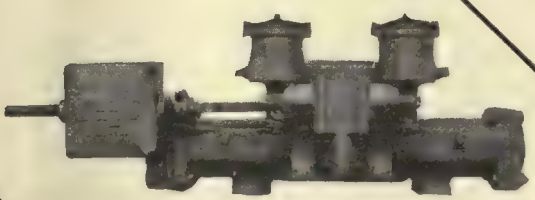
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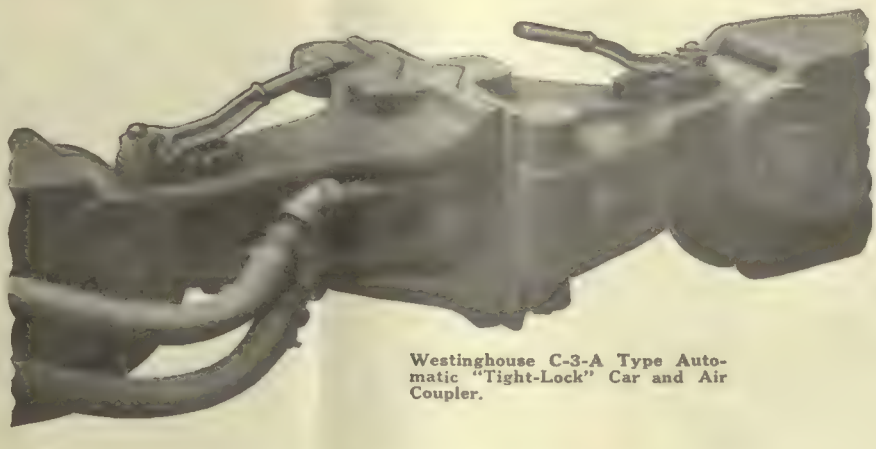


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The Electric Railway Improvement Co.
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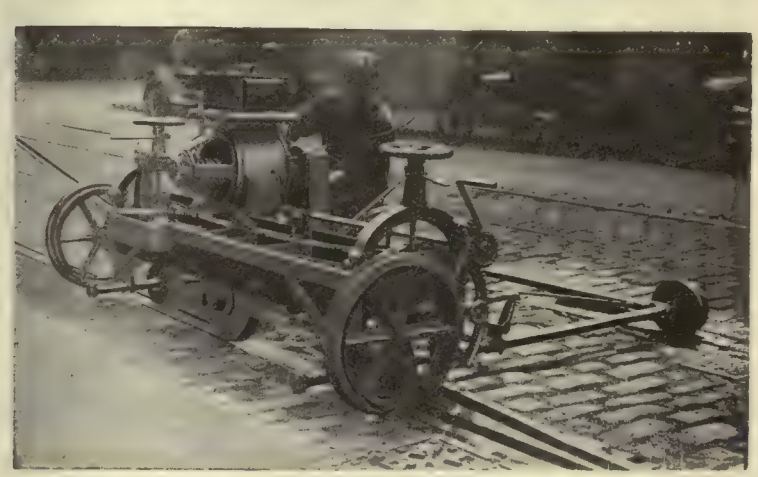
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PITTSBURGH PENNSYLVANIA

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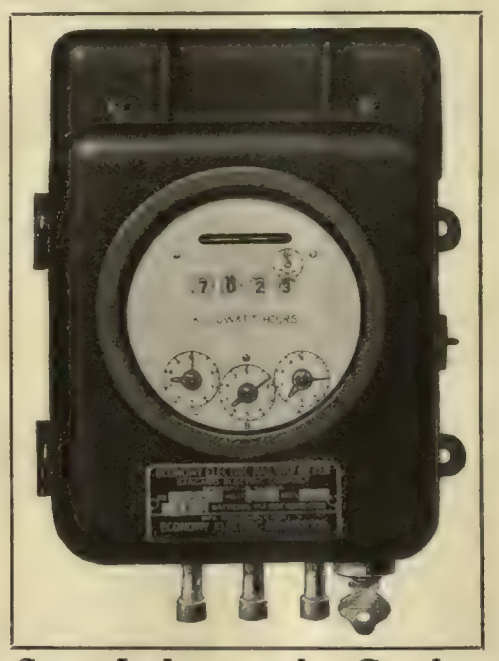
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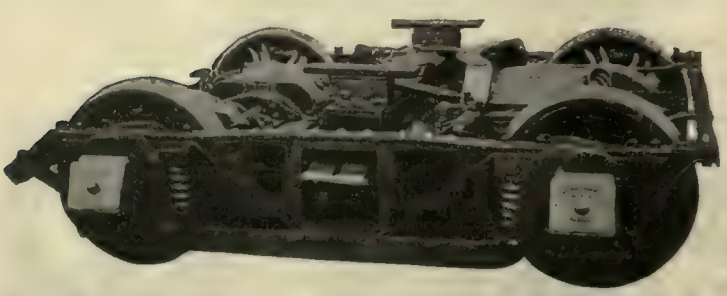


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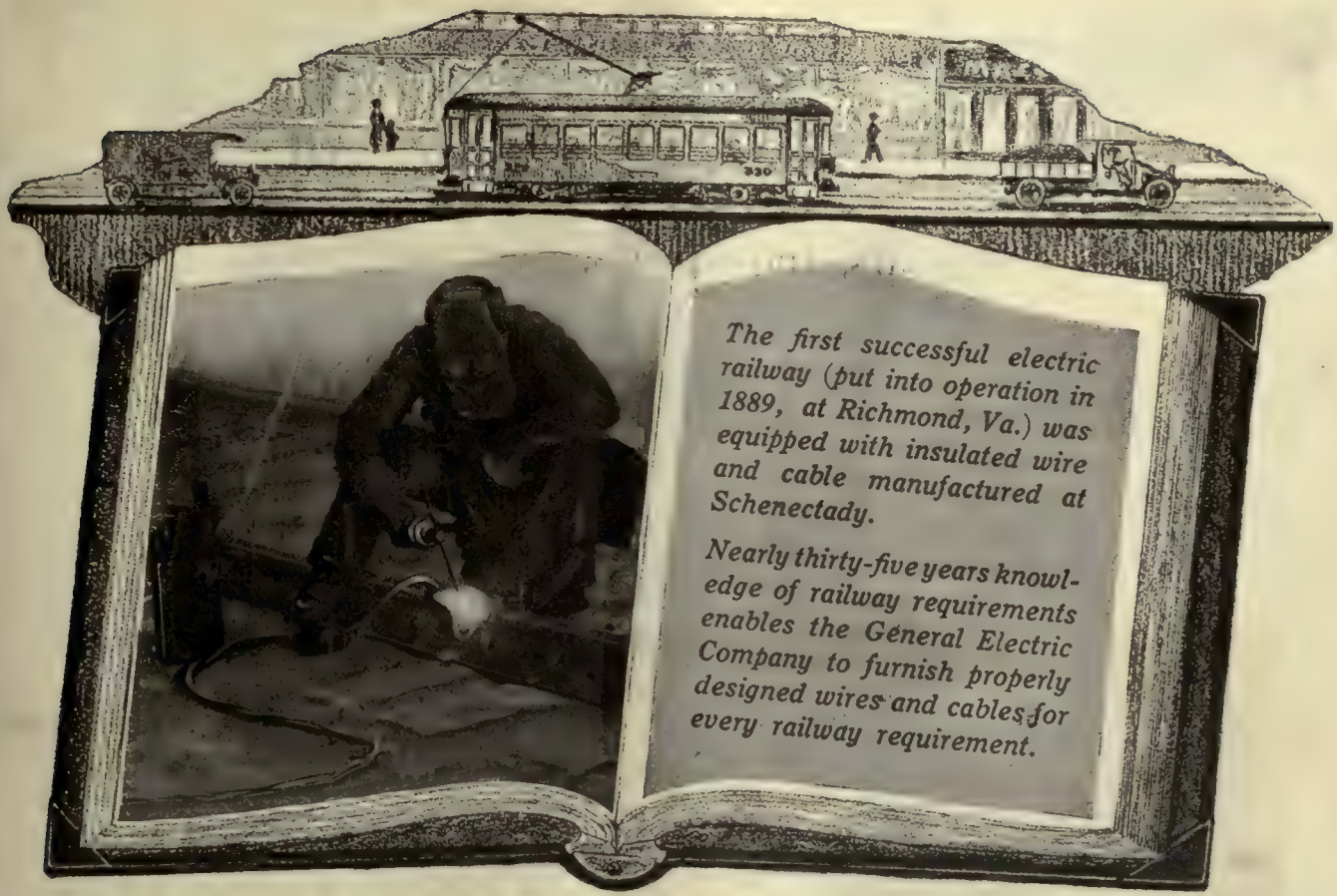
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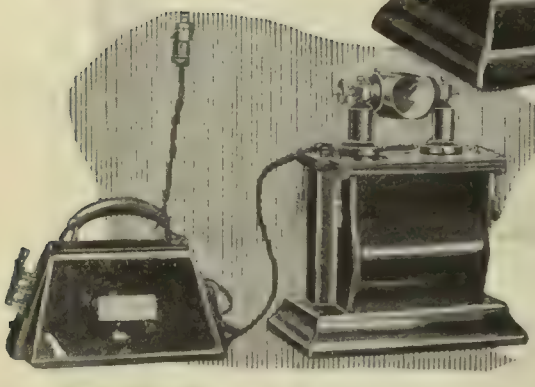
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GENERAL ELECTRIC

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New York, Saturday, May 5, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61
Number 18

Selling Transportation Is More than a Mere Advertising Slogan

SO MUCH has been said about "selling transportation" that there is some danger lest the practical railway man shall come to regard the idea as a mere advertising catch-phrase. But the experience of the Binghamton Railway, described elsewhere in this issue, proves again that there is a great deal more to the idea than that. By a carefully planned policy of giving the public real service this company has achieved an enviable popularity.

Two main points of their policy stand out. In the first place, bright and attractive looking cars, well heated, well lighted and well ventilated, have encouraged riding. In the second place, the point of view of "How will it affect the passenger?" has served to eliminate many of those little things that keep the public antagonistic.

It seems that some electric railways do not concern themselves with the psychology of the passengers. Cars are delayed at the carhouse while crews are changed or trainmen draw their pay. Cars are pulled in for inspection or minor defects and the passengers forced to change. Stops for collection of second fares occasion annoying delays. Too many "special" cars run by waiting people. While none of these things is particularly important in itself, there is usually no compelling necessity for them, and all together they form a series of irritating "little things" that dispel the friendly feeling engendered by service with dispatch. If the railway hopes for the beneficial results that follow a well-directed campaign of "selling transportation" it must not forget to iron out such little annoyances as these.

Cars Built for Comfort and Convenience

THE London Underground Railway is trying out six sample cars in its tube service which were built by six different manufacturers. While many electric railway operators in the United States will think that the attention given in the design of these cars to luxurious furnishings and provisions for reducing noise was needlessly great, there are nevertheless many features worthy of consideration by American designers, particularly for cars to be used in interurban and rapid transit service where the ride is long and where comfort and attractiveness are important factors in inviting riders.

A brief summary of the details of construction, together with the interior illustrations, given in this issue, show the results that have been accomplished by the various builders. Probably no finer cars of this class have ever been built. The measures taken by the designers to reduce the noise resulting from the operating of steel cars in an inclosed tube are particularly interesting. Wheels have been shrouded with various materials. Windows have been reduced in size and window frames done away with to eliminate rattling and minimize the noise or vibration transmitted through the glass. The car bodies are sound insulated, and this feature has also been extended to the framing of the seats. That much has been accomplished is evident from the comparison of the sound photographs reproduced with the article. It is stated that a marked difference in noise is noticeable by walking from one of the new cars into another on which no special precautions have been taken to reduce noise.

In the material used the large amount of rolled sections is particularly noticeable. The seating is longitudinal throughout, but special barriers are provided at the entrances so as to shield passengers from drafts. Various lighting arrangements have also been tried and the lighting fixtures embody attractive designs.

Some of the British designers consider that the industry has been standing still for years in respect to rolling stock and that improvement in design and construction is now essential.

Electrification Gets a New Impetus in Virginian Railway Project

THE announcement of the Virginian Railway this week that it has let contracts for the electrification of 213 miles of track in the Blue Ridge mountains may be considered an epoch in heavy transportation. This railroad, in its brief existence of fourteen years, has developed a traffic in heavy freight equaled by few roads. In order to move this immense volume trainloads of 5,500 tons have been hauled at speeds of about 7 m.p.h. by three of the heaviest Mallet locomotives. Even this has been insufficient to care for the growth of the business, and electrification has been resorted to as the only solution, for by it the trainloads can be increased to 9,000 tons, and the speed to 14 m.p.h. Indeed, it is anticipated that the trains can be as great as 12,000 tons when the system is fully equipped.

Full details have not yet been worked out, but the system will be operated with a single-phase trolley at 11,000 volts. This is to be stepped down by transformers along the route from an 88,000-volt transmission line. Power will be supplied by a 90,000-hp. generating plant to be erected on the New River. The decision to employ single-phase trolley on such an important project as this is significant, if considered from the viewpoint of a possible trend toward standardization of the trolley system. With agreement of engineering opinion on no more than this one thing, electrification work would go forward on a much more sound basis, as motive power could then be operated on any line regardless of the kind of equipment used on any particular locomotive.

The paper presented at the spring convention of the American Institute of Electrical Engineers by A. H.

Babcock of the Southern Pacific Railroad gives another phase of the electrification problem. Tests made on oil-burning engines on this road indicate a higher fuel economy than is accredited to steam locomotives by some electrification proponents. Mr. Babcock's deductions from these tests were criticised in the discussion. But there can be no issue with his major proposition that electrification may be desirable for many other reasons than economy. No better proof of this could be cited than the decision of the Virginian to spend $15,000,000 for its Blue Ridge project, which is primarily for the purpose of increasing the capacity of the road.

Why Are Anti-Friction Bearings Not Used on More Electric Cars?

AS A PIECE of machinery containing many bearings, the electric car has been carefully studied for a long time by bearing experts with a view to providing it with the best possible bearings. The ordinary sleeve bearings used on the motors and air compressors, and the journal bearings are satisfactory from considerations of simplicity and cost, but they have their limitations in regard to friction and durability. Hence, from the early days of the electric railway attempts have been made to produce anti-friction bearings which would not only cut down energy consumption but would increase bearing life. Bearings of a high degree of mechanical perfection have been produced for this purpose, but so far hardly a start has been made in convincing electric railways that they are successful in this field. However, the success of anti-friction bearings in the automobile and manufacturing fields indicates that they ought to have great possibilities on electric railway cars.

As far as friction reduction is concerned, there is no question as to the ability of the anti-friction bearing to cut costs. The article in the issue of this paper for April 21, giving results of tests made on electric car roller bearings in England, demonstrates this clearly. Such additional proof, however, is hardly necessary because the same thing has been shown time and time again by tests made in this country. Why, then, if ball and roller bearings are so nearly frictionless, have they not made more headway in the electric railway industry?

The first handicap which the anti-friction bearing has had to overcome is that of high first cost. By its very nature such a bearing must be made of excellent material by highly skilled mechanics. A cheaply made bearing is sure to fail. Offsetting this high cost is, of course, the capitalized value of energy and maintenance savings. If there is a convincing difference in favor of the more expensive bearing, this type will ultimately be used. It takes time, however, to "sell" the electric railway industry on any proposition that involves large capital investment. The industry has been short of money and has felt it necessary to spend this money on changes in practice which gave promise of greater return on the investment than did anti-friction bearings.

Involved intimately with the matter of cost is that of durability. A ball or roller bearing must have a life of several years to compete with the ordinary "friction" bearing. As endurance tests must be continued so long, it is very difficult to prove the success of any particular design. If accelerated tests could be devised which would be acceptable to electric railway managers, this handicap might be overcome. The fact is that anti-friction axle bearings as made in the past have not had sufficient capacity to enable them to withstand the shocks of railway service. Manufacturers, of course, realize this and are taking steps to increase the strength.

Another handicap of the anti-friction bearing is its complexity as compared with the ordinary bearing. Master mechanics strongly favor simple devices. They particularly object to the necessity of pressing a bearing off an axle as contrasted with the simplicity of removal of a plain journal bearing. Further, the accurate adjustments which have in general been necessary with the anti-friction bearing have been objectionable in view of the small degree of skill often available in shops. As a result, while the admirable qualities of frictionless, wearless bearings appeal to the master mechanics, their practical difficulties prejudice them against the theoretically better bearing.

The bearing ought to be pushed for interurban service first. There it can demonstrate best its capacity for saving energy, whereas in city service bearing friction plays a less important part relatively because more energy is used in starting and stopping. If it were well established in the interurban field, the bearing could then more easily invade the city.

Unique Features of the Frankford "L" Signaling

THE account of the signaling system of the Frankford Elevated Railway in Philadelphia, given by J. N. Dodd in articles in this and the last issue of the ELECTRIC RAILWAY JOURNAL, covers one of the most important installations of recent years. Among many features the plan used for controlling the speed of trains at certain points by allowing a definite minimum time between signals is of special interest. Again, the provision of push-buttons on standards to permit the depressing of track trips from the motorman's cab window is worthy of notice. The trainmen were desirous of having a door at the front of the car as a means of exit, particularly for the purpose of lowering the trips. This was considered impracticable by the car designers, but the push-button standard was accepted as a substitute for the desired door. Excellent, also, is the mechanical arrangement of the air distribution system and the electric circuits, which were worked out with special care amply justified by the results. The availability of air for operating track tools is a by-product of the signal installation which should simplify maintenance work.

The design of the Frankford Elevated signaling was slightly complicated by the fact that the trips on the Philadelphia Rapid Transit cars and those of the Frankford "L" are differently located and the system had, therefore, to provide for both types of cars. It was in details like this, as well as in the larger matters such as expediting traffic at the junction of the new line with the Market Street subway-elevated line, that the installation is noteworthy.

Signaling is one of the phases of electric railway work that suffered acutely from the depressed condition of the industry during war time. The situation is now improving somewhat, as is indicated by work like that on the Frankford line, although operators are not yet fully reawakened to consideration of the possibilities of a good signal system in increasing safety, speeding up schedules and permitting full use to be made of track.

New Cars for London Underground Railways

The Cars Are Particularly Luxurious in Their Furnishings—Considerable Attention Has Been Given to Reducing Noise and Vibration—Wheels Are Shrouded and Window Openings Reduced in Size

ON FEB. 3 there was a demonstration run on the Great Northern Piccadilly & Brompton Railway of a train including six new experimental trail cars. The London underground electric railways are being extended, and it is the desire of the management to introduce improved rolling stock, especially for the longer journeys which will soon be possible. Some time ago Lord Ashfield, chairman of the companies, instituted a competition among five car manufacturers for the construction of the best type of electric car to suit the conditions. Orders were placed with six firms for the production of one car each, namely, the Birmingham Railway Carriage & Wagon Company, Cammell, Laird & Company, the Gloucester Railway Carriage & Wagon Company, the Leeds Forge Company, the Metropolitan Carriage, Wagon & Finance Company, and the Gloucester Company.



Car 720—Designed by the Underground Engineering Staff



Car 820—The Color Scheme Is Light Blue

General essential features were specified, but otherwise the builders were given a free hand. An important point specified was that the door dimensions of all the cars should be similar. The arrangement is different from that of the original rolling stock. Some of the existing cars have both end doors and center doors, and some only end doors. The new cars have no end doors nor center doors, but are provided with two double sliding doors on each side, each pair being about one-third of the distance from the end of the train. On starting from a station, all the doors have to be shut before an automatic signal can be given to the operator to start.

Several arrangements have been adopted to reduce noise, which is very pronounced in "tube" tunnels. The wheels have been shrouded by a covering, and the size of the windows has been reduced. It was found that the larger the windows the more the noise. A reduction in sound has also been effected by ventilating the cars from the roof instead of from the windows. The result is that passengers can converse without unduly raising their voices. Graphs were obtained comparing the intensity and fluctuation of noise in an ordinary tube railway car and in one of the new ones, and specimens of these are produced herewith.

The new cars are of steel, and in external appearance and size are similar to the old. Each seats forty-eight passengers. Internally, however, they vary in finish according to the ideas of the builders. The seats, upholstered in moquette, are luxuriously comfortable. The decorations include gray, blue and gold, blue and gray, green and brown, mahogany and maple, and brown and white. The metal fittings are in oxidized silver finish, aluminum, and oxidized copper. In one case the floor, instead of having narrow wood slats, is covered with a non-flammable rubber composition fabric.

The scheme of vertical rods from floor to ceiling for the use of standing passengers—tried on a number of previous cars—has been abandoned, and a reversion is made to straps to which standing passengers can hold. Most of these loop straps are, however, much improved, so as to be more comfortable to the hand. Concealed lighting is adopted in one car, but as usual in such a case more lamps are required. The new cars are being subjected to severe tests, and these will decide what is to be the new standard car, of which probably about 200 will be required. Some of the essentials of construction of the various cars are as follows:

Car No. 823—Birmingham Railway Carriage & Wagon Company, Ltd.

The body is built of U-section pressed-steel pillars and angle section rails, securely framed together and paneled with cold-rolled close-annealed plates riveted to the framing. The roof is of clerestory type and consists of mild steel plates riveted to light angle carlines, and the whole is secured to cant rails. Frameless win-

dows contain balancing devices and drop 6 in. Ventilation is by a series of air scoops fitted in the roof; air passes into a channel formed by the clerestory rail and inside panel and is controlled by ornamental grids inside the car. The body of the car is sound insulated by sheet cork secured to the inside panels, while the roof has a double layer of insulating cork. One layer is secured to the roof plates and the other layer to the top of the ceiling panel. The floor consists of successive layers of slag wool, asbestos and cork, with wood slats above. Over the trucks a further layer of asbestos insulation is secured. To overcome the "drum" effect caused by the longitudinal seats which also form wheel boxes, thick "Wadnit" sound insulation is used, secured to the seat plates. The wheels are fitted with wood blocks between spokes to reduce the metallic ring when in motion.

Seats are of Woods' patent wire-woven type, of special light construction, suitably upholstered and covered with moquette. The car interior is decorated with polished mahogany moldings, panels being painted French gray and further relieved on the end and door pocket panels by ornamental festoons. Ceiling panels are of Agasote, with "Adams" treatment in decoration, and painted white. Doors are of a double sliding type, electrically and pneumatically controlled. All main pipe fittings for the door system are located in two of the longitudinal seat boxes.



Car 821—Bowl Fittings Are Used for Lighting and Aluminum Trim Is Employed Quite Extensively



Car 822—Upholstery Is in Blue and Paneling Is Mahogany and Maple

The underframe is of light rolled sections for solebars and longitudinals, bolsters and headstocks being pressings. Truck frames are of mild steel plates and angles, and bolsters and spring planks of pressings. Bolster springs are of double elliptic type, and side-bearing springs of a laminated type with auxiliary springs of rubber. The truck brake rigging is arranged for all wheels to be braked on both sides, and the type of rigging permits of automatic slack adjusters being used, and for the brakeshoes to be worn out without the necessity of hand adjustment. Exteriors are painted in vermillion, black and cream, in accordance with the specification as in the case of the other vehicles. All fittings have oxidized silver finish.

Car No. 824—Cammall Laird & Company, Ltd.

Only marketable materials are used, but the advisability of using high tensile steel in future is considered further to lighten the structure. Truck wheel bases have been increased from 5 ft. to 6 ft., giving steadier running. There are three systems of springs between axle truck boxes and car body; anti-vibration packings are inserted between bolsters and truck center bearings. To obtain noiseless running all play in moving parts has been reduced, and "Ferodo" wearing surfaces have been introduced in the brake rigging and elsewhere. The floor consists of steel dovetail sheeting, with an upper layer of floorboards, the space between being filled with a granulated cork composition. The sides and roof are insulated with three-ply "Salamander" hair felt between inside and outside linings. This insulation is rendered fire-resisting. Canvas is applied to the inside paneling and seat plates to prevent "drumming." Each truck is shrouded in a leather covering reaching down to within a few inches of the rail.

Structural work is of the lightest possible description consistent with strength. Unit principles in design have been adopted to avoid multiplicity of details and fittings. The center roof plates are flanged on the outer edges to avoid the necessity for roof purlins. Aluminum is used wherever practicable for the construction and for interior fittings. Panel plates are flanged on their edges to obtain stiffness without the need for providing additional stiffeners. Outside moldings and joints have been avoided wherever possible. The framing and paneling of side doors is entirely of aluminum.

Seats and seat backs are fitted with coil spring cushions. The ventilation includes balanced-side sliding windows, sliding glass panels in end doors, and louver type ventilators in the clerestory, operated by cam action. Outside ventilators of special type, combining intake and exhaust action in either direction of travel, are used. This type of outside ventilator has not previously been employed, but has been the subject of exhaustive tests and trials. Doors have soft rubber flexible edges to give the required resiliency and to obtain a weather joint, while at the same time preventing risk of injury should a passenger's hand or a portion of his clothing be trapped between the two doors when closing. To maintain the door tracks free from obstruction, a track cleaner is fitted to each side door.

Diffused lighting is a feature of this car. The main lights are placed in troughs, housed inside the deck rails and glazed on the underside with semi-transparent glass mounted in hinged frames. These troughs are utilized as longitudinal roof members. The underframe

embodies two strong central girders, which take up the principal draw and buffing shocks and form the load-carrying members, so that the side doorway openings do not cut into the main underframe members, as would be the case if the solebars carried the load. Floor and side loads are transmitted to center girders by braced crossbars. Over the truck the seat front plates serve as the central girders. The interior decoration is in blue with gold finish.

Car No. 820—Gloucester Railway Carriage & Wagon Company, Ltd.

Trucks are of Gibbins' spring frame type, giving easy riding, as the load is taken direct on the springs from the main frame; the weight of the body is taken on roller side bearings, and not on the center bearing, thus eliminating side roll, while the fact that there is no clearance between axle boxes and bolster to be taken up, as on the ordinary truck, gives smooth starting and stopping. The weight is also considerably reduced.

The car body is insulated by "Wadnit" rammed between exterior and interior panels, the former being lined with canvas. Windows are of frameless type, fitted with spring balances and arranged to fall 6 in. Spring roller curtains can be fitted to all windows if required, one being supplied. The curtain roller is out of sight, being attached to the top light mold and easily removed. Twelve ventilators are fitted in the monitor, of pivoted vane type, exhausting the air automatically in both directions. Hit-and-miss covers are provided to regulate the exhaust.



Car 823—Seats Are of Special Light Construction Covered with Moquette



Car 824—Diffused Lighting Is Used and Decoration Is in Blue and Gold

Seats are of "Peters" type, covered in moquette. One cross seat has been fitted with "Woods" woven wire for comparison. The double side doors are of mahogany, sheathed with aluminum and operated by air engines. All doors are fitted with rubber edges, forming a flexible and watertight joint. The interior finish is of Agasote panels. No cornice moldings are used, and the molds employed are of light and plain type so as not to harbor dust. Hand grips of special type in polished mahogany are suspended from the roof. The color scheme is light blue. Metallic fittings are silver oxidized.

Car No 821—Leeds Forge Company, Ltd.

Truck frames are of pressed steel, giving ample strength without excessive weight. The bolster suspension is designed to prevent excessive lateral movement on curves. The springing is arranged to reduce unsprung weight, to obtain resilience without undue vertical movement, and to absorb rail shocks near the point of origin. Shrouding plates are of steel, covered on the inner and outer surfaces with canvas, and with hinged side plates for examination. The end shrouding is sloped to deflect sound onto the roadbed.

The underframe is of pressed steel construction, and in so far as load carrying is concerned, is incorporated as a unit with the body. The headstocks, together with the end top plates, form a rigid structure for transmission of buffing shocks, and at the same time care for racking stresses. Both mid-longitudinals and crossbars run through, the latter being under the former and connected by means of rack plates.

In the buffing and drawgear "Ferodo" bushes have been used for the sector bar pins, and also for the platform plate plungers. The design of the body was prepared with a view to ease and quickness of production, there being no unwieldy portions to obtain or handle. Sides, ends and roofs are built in jigs as units to secure complete interchangeability, all parts being drilled to templets. The construction is all steel, aluminum or alloy only being used for doors, fittings and interior moldings.

Timber is used only for floor slats, window capping, end door posts, windscreen parts, handrails and on ends of seats. The sides are constructed with pressed-steel pillars, sheeted on the outside with steel plates, there being no expensive window or other pressings. Horizontal moldings, cant rails, crib rails, inside waist rails, and door pocket members are of rolled-steel sections. The interior sides and ends are of steel sheets secured to the framing. Aluminum molding is secured by means of wood screws into fiber blocks. The ceiling is of Agasote, secured to the roof framing in the same manner.

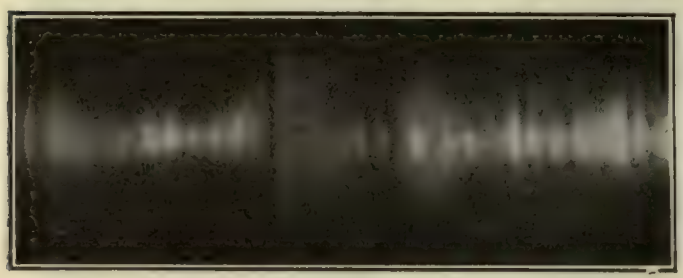
The side sliding doors are of one-piece aluminum castings sheeted on both sides with aluminum plates. They have standard rollers at the bottom with the exception that an eccentric pin is pivoted to lift or lower the doors when the very limited clearances allowable make it necessary. A "Crittall" runner is fitted, and is provided with springs which allow the door to ride over any obstruction, and also to prevent rattle. A "Crittall" runner has also been fitted at the rear of the sliding door for connecting to the air motor arm. The sliding doors are fitted on the closing sides with sponge

rubber safety edges, molded to fit one slightly into the other, and are of such soft nature as to provide, with the compression of the air motor springs, a complete watertight joint. They also effectively prevent injury to a limb, and allow clothing, etc., to be very easily withdrawn when the doors are closed and the coach is in motion.

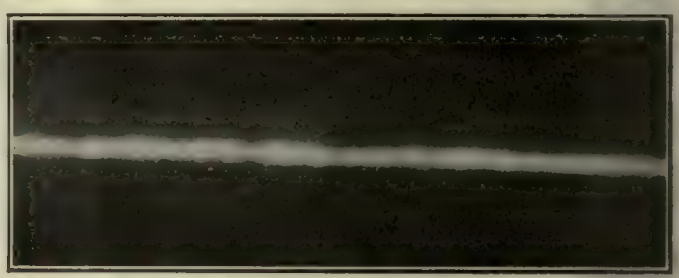
Windows are provided with zinc water pockets, and the lifting gear is made as one unit. Seats are of Vi-Spring pattern, made by the Marshall Patent Mattress Company. Longitudinal seats are constructed individually, to permit easy access to the door operating gear, and for economy in repairs.

Ventilation is by extraction. There are twenty-eight extractor ventilators in all, twenty of which ventilate the interior of the car. The remaining eight ventilate the air space between the outer and inner walls of the body. Electric lamps, inclosed in Holophane bowl fittings, are installed at the lower clerestory and the center ceiling. Emergency lights are fitted into two of the bowl fittings, making it unnecessary to break up the ceiling by further fittings. Two extra bulbs are provided for an illuminated sign.

Noise insulation includes canvas attached to the inside of the outer sheeting of sides, ends and roof and between all metal-to-metal joints, and use of hair felt. The floor is of key section steel, the trough being filled with cork. A layer of cork covers the whole of the key flooring, and on this are laid the wood slats. The interior is designed to avoid dust-collecting ledges. Bright surfaces requiring cleaning have also been avoided. The interior decoration is in green and brown. Fittings are of aluminum. Straps are attached to sockets suspended from the roof.



Sound Photograph Taken in Ordinary Tube Car



Sound Photograph Taken in One of the New Cars

CAR NO. 822—METROPOLITAN CARRIAGE, WAGON & FINANCE COMPANY, LTD.

Among the special features of this car are that nickel steel has been used for the undergear; that the flooring is of corrugated steel with a thickness of non-inflammable wood and a fluted covering of fire-resisting rubber; that white-metal sheets are used for paneling; that natural non-inflammable material is used for seat rests, etc., and that sliding doors are of self-centering construction.

To reduce noise the wheels are filled in with teak segments, sound-insulating materials are freely used, and even the painting scheme includes the use of Docker "loaded" paint, having qualities by which it assists to deaden sound vibration. The trucks are completely shrouded with pulped wood sheeting, with flapdoors for inspection. The ends are streamlined.

Trucks have 2-ft. 8-in. wheels and laminated side bearings fitted with Spencer's auxiliary rubber springs, double elliptical bolster springs are provided, and "Metro" patent ball-bearing center plates and roller side bearings are fitted to reduce friction. The underframe includes bulb angle section solebars, and pressed-steel headstocks, bolsters, crossbars and longitudinals, and has reinforced end construction. "Ferodo" strips and washers are used extensively for trucks and underframe and elsewhere to prevent noise.

The body consists of light steel pressings for pillars, and angle sections for bracings, longitudinals, side members and roof. Side and end plates are of aluminum and copper alloy. Windows each consist of two complete steel pressings. Spaces between the inner and outer sheeting of walls and ceilings are sectionalized by small wood packings, to reduce "drumming," the spaces being filled with eel grass quilting, a material useful both for sound and heat insulation.

Sliding doors include aluminum plates, light steel channels and wood linings, spaces being filled with eel grass quilting. A ball-bearing attachment between the door-operating air-motor and the door minimizes sliding friction. A new type of door roller is employed, enabling the door to be removed readily without disturbing the runner track, while V-rollers provide for self-centering. There are also twin ball races giving correct alignment. Special arrangements are made to obtain weather-tightness between the doors, while the meeting edges are fitted with rubber joints which enable a passenger (or his clothing) who may be trapped to withdraw.

Windows have drop lights apparently frameless, provision being made for easy cleaning, adjustment and withdrawal, to avoid rattle, and for draining rainwater. Ventilators in the clerestory are of "M. & M." pattern, with staggered air openings. Air scoops are also fitted. Half the seats have small closely-nested springs, with spiral springs for the backs; the others have seats and backs of woven wire with supplementary spiral springs. All seats are in self-contained frames, these and the backs being removable. Seat risers and top plates are heavily shrouded to reduce noise. Strap-hangers are of light gray rubber with strong canvas inserted.

Electric lamps are sunk in flush with the spherical bulb, the lights themselves being opalescent or frosted glass. Dust-collecting ledges, etc., are avoided. Ceilings are of Agasote fire-resisting millboard, with light upper decoration. Fittings are of bronze. Upholstery is in blue, and the interior of the car has mahogany and maple paneling.

CAR NO. 720—UNDERGROUND COMPANIES' DESIGN

(Constructed by the Gloucester Carriage & Wagon Company)

The interior decoration is in brown with white paneling; fittings are in oxidized copper. The lighting is entirely by side brackets, except for two emergency lamps in the center. The seats are of "Nesta" all-metal design, covered with moquette, and the arm rests with

leather. Straps include Bakelite handles on swivel joints attached to the clerestory rail. The ceiling is white, decorated in the "Adams" style.

To reduce noise the roof and body are insulated by sheet cork and "Wadnit" asbestos, the flooring, which is otherwise to the usual "Underground" standards, being similarly insulated, but having different thicknesses of material. The trucks are of an improved design not hitherto used. They are provided with shrouding of "Wadnit" asbestos secured to underframes of wheel boxes, "Sundela" board panels being used on sides and ends of bogies. The exterior body panels are of steel, the interior panelling being of asbestos millboard. Doors have wood frames covered on either side with aluminum plates. Special attention is given to weather tightness, while a drainage system is provided to deal with rainwater. The side sliding doors have rubber edges to prevent injury to a passenger who might be trapped or his clothing caught, as in the case of the other cars.

Cost Accounting in the Engineering Department

An Account of the Present Practice of the Montreal Tramways by Which the Capital and Other Cost Data Are Maintained Continuously and Promptly—Exact Specification of Clerical Duties Is a Factor

By R. B. Genest
Chief Clerk Engineering Department, Montreal Tramways

ABOUT four years ago the engineering department of the Montreal Tramways found it desirable to revise the system of cost accounting previously in use. This came about on account of the rapid expansion of the department due to increase in track mileage, construction of new and improvement of old buildings, standardization of track construction, etc.

To this end the filing and record systems were revamped and other general improvements made, as will be detailed in a later article.

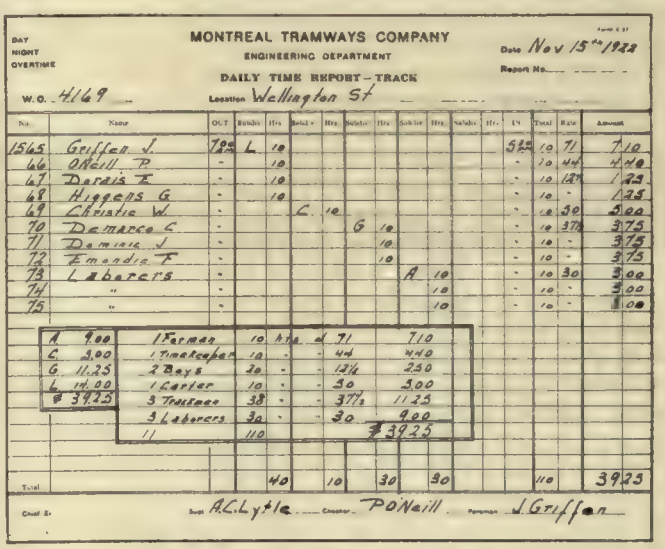
The objective was to secure the cumulative cost records without the tiresome and time-wasting summarizing of figures and reports usually following the completion of a job of track or other work. To accomplish this, several forms are filled in by the checkers or inspectors who are constantly on hand at the job. These forms for securing the original data are as follows:

Daily Time Reports. Fig. 1—This form is used to cover time made on all work executed by the engineering department forces, with the exception of snow removal. It was originally intended for trackwork only, but was found to be applicable also to the work of the departments of bridges and buildings, tools and machinery, and bonding, welding and grinding. The alphabetical subdivisions of the labor distribution are shown on a sheet in a summary.

This form is made in triplicate. One sheet is forwarded to the accounting department for auditing purposes, one is retained by the engineering department, and the third remains in the timekeeper's possession.

Forms for Requisitioning and Transferring Material. Figs. 2 and 3.—The delivery, return or transfer of material is covered by the forms shown in these illustrations. Fig. 2 is the form used for requisitioning or ordering material. It is made in triplicate, distributed as above. No material can be transferred or returned unless the shipments are accompanied by three copies of the form shown in Fig. 3. This serves the manifold purpose of a transfer slip, a credit note, a receipt, and a shipping bill. A fourth copy is signed by the material car conductor and is held by the checker.

Daily Report of Track Construction. Fig. 4.—This


MONTREAL TRAMWAYS COMPANY
ENGINEERING DEPARTMENT
DAILY TIME REPORT—TRACK
DAY / NIGHT / OVERTIME
Date Nov 15th 1922
W.O. 4149
Location Wellington St

No.	Name	OUT	Subdiv	Hrs	Subdiv	Hrs	Subdiv	Hrs	Subdiv	Hrs	Subdiv	Hrs	LV	Total	Rate	Amount
1565	Griffon J.	Tps	L	10									5½	10	71	7 10
66	ONeill P	-		10									-	10	44	4 40
67	Derais E	-		10									-	10	13½	1 25
68	Higgens G	-		10									-	10	-	1 25
69	Christie W.	-			C	10							-	10	50	5 00
70	Demarco C	-					G	10					-	10	37½	3 75
71	Damais J	-						10					-	10	-	3 75
72	Emandis E	-						10					-	10	-	3 75
73	Laborers	-							A	10			-	10	30	3 00
74	"	-								10			-	10	-	3 00
75	"	-								10			-	10	-	1 00

A 9.00	1 Farmer	10 hrs	@ 71	7 10	
C 3.00	1 Timekeeper	10	-	4 40	
G 11.25	2 Boys	20	-	12½	2 50
L 11.00	1 Carter	10	-	30	3 00
# 39.25	3 Trusses	38	-	37½	11 25
	3 Laborers	30	-	30	9 00
	11	110			$39 25

Total 40 10 30 90 110 39 25

Chief Cl. Asst. A.C.Lytle Checker P.O'Neill Foreman J.Griffon

Fig. 1—Daily Time Report Form

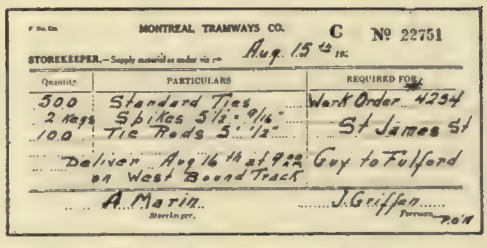

MONTREAL TRAMWAYS CO. C № 22751
STOREKEEPER.—Supply material as under via
Aug. 15 1922
Quantity | PARTICULARS | REQUIRED FOR
500 Standard Ties | Work Order 4234
2 Kegs Spikes 5½ : 9/16"
100 Tie Rods 5' 1/2" | St James St
Deliver Aug 16th at 9 P.M. Guy to Fulford on West Bound Track
A. Marin Storekeeper. | J. Griffon Foreman

Fig. 2—Requisition Form

form is used on all trackwork with the exception of section gang maintenance. It indicates work progress by means of the rough diagram and legend, furnishing at the same time a summary of material received daily and memoranda on working forces and cost of labor.

Section Foreman's Daily Report. Fig. 5.—The sample which is reproduced shows clearly the purpose and use of this form which is used to cover the operation of section gangs on maintenance work.

Daily Working Force Report. Fig. 6.—In order that

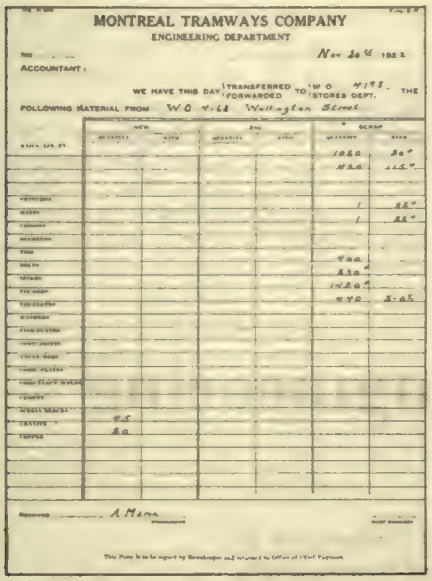


Fig. 3—Form for Use in Transferring Material

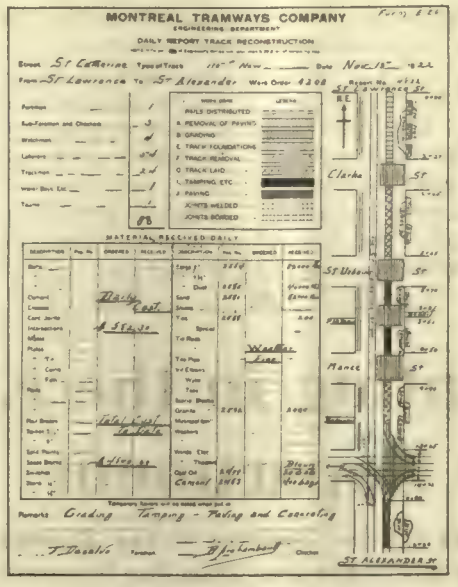


Fig. 4—Daily Track Construction Report Form

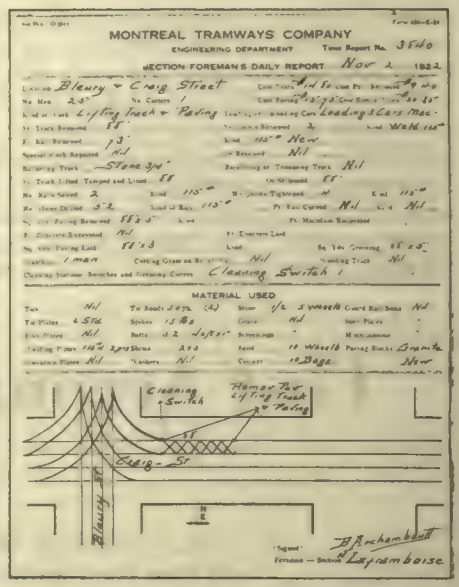


Fig. 5—Section Foreman's Daily Report Form

the head office may be informed of the total number of men employed daily on trackwork, the form shown in Fig. 6 was designed. Information for use in filling in this form is telephoned or forwarded by messenger to the head timekeeper's office before 9 a.m. from the different locations and is summarized as shown. The printed names on the left side of this form under the heading of "West Division" and "East Division" indicate the section gang.

Movement and Time of Work Cars. Figs. 7 and 8.—The movements of construction and material cars and the time allotted to them are checked and audited by the use of the forms shown in Figs. 7 and 8. Two forms were necessary because the crews of construction and material cars are paid by the operating department and the running time is charged to the engineering department. It was therefore found expedient to evolve some simple method of auditing these charges.

The Evolution of a Work Order

To illustrate the way in which information for cost accounting is gathered, the following summary of the principal parts in the execution of a track job will serve to show the procedure from the inception to the termination of a piece of work.

Assuming that it has been decided to renew or extend the track at a specified location, the first steps are the compilation of an estimate of the cost, the drawing up of material lists and specifications, the preparation of working drawings and application for a work order showing the cost and the charges to capital or renewal. This is forwarded to the proper authority for visé, and as soon as official sanction for the work has been given, permitting the use of an appropriation for the purpose indicated, a numbered work order is issued by the accounting department, and under this order number all actual cost charges are accumulated.

In the meantime, official notice is forwarded to the heads of the municipal department and a permit is obtained to carry out the work on the city streets. Notifications are also issued to the heads of other company departments concerned.

Next, a foreman and a checker are appointed for the job, the construction car is instructed to pick up tools, stock material, shanties for the checkers, etc., from the stores, the gang is organized and the job under way.

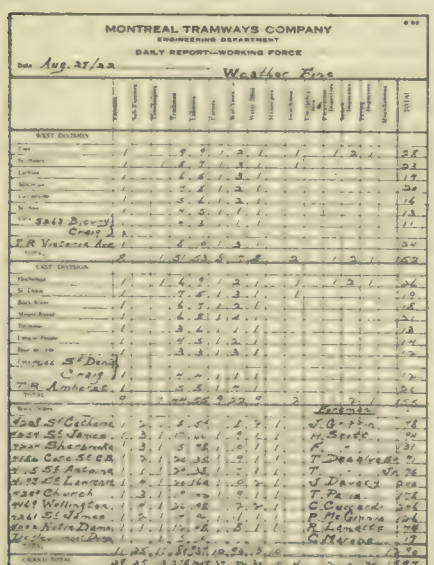


Fig. 6—Daily Working Force Report Form

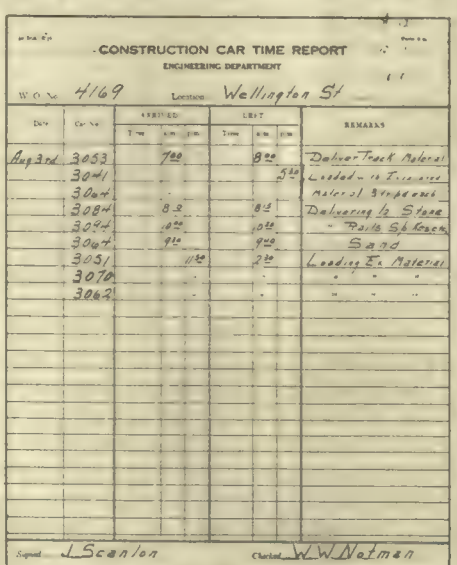


Fig. 7—Form for Recording Movement of Work Cars

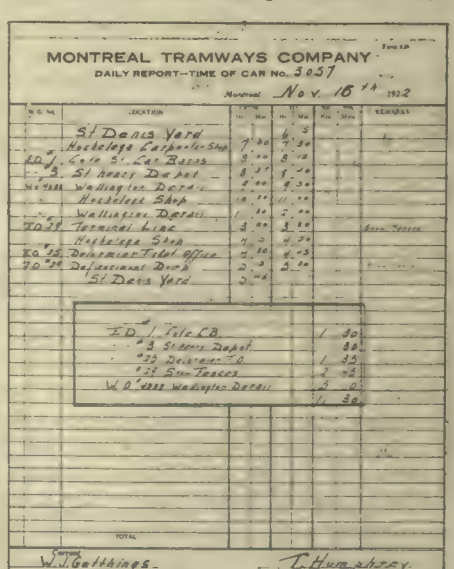


Fig. 8—Work Car Time Record Form

When the job is completed, the checker fills in the form shown in Fig. 9, the final report on track construction, and forwards it to the head timekeeper's office, together with a rough sketch showing a general layout of the work as actually just done.

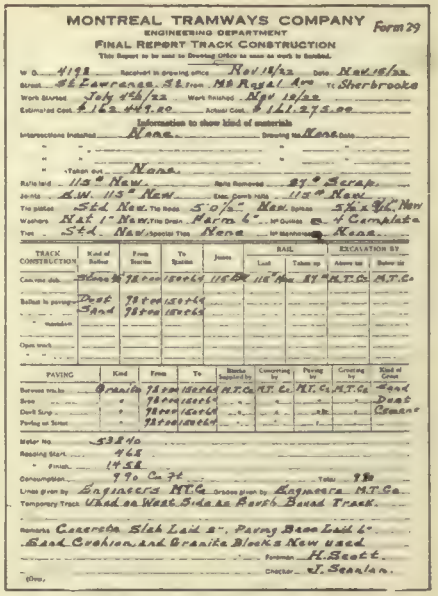
The checker also turns in his field ledger, containing the summarized detail of labor charges, and also details of material received, transferred or returned. This field ledger is closely examined and audited; the labor charges are checked against the original time sheet (Fig. 1); the material records are balanced against the original requisition (Fig. 2), and checked against the storage department delivery sheet and freight way bill.

This preliminary audit of cost records holds back the final report for two or three days, but the delay is advantageous as the cost checking of the records of the stores and engineering departments reduces to a minimum the possibility of error. The final report, ledger sheet and sketch are then clipped and fastened together, placed in a file folder, labeled and numbered and sent to the chief clerk for inspection. After this they are turned over to the estimating engineer for record and comparison with the original estimate.

Dissecting and Classifying the Cost Records—the Track Record Card System

With the data of a new job in hand, it remains only to incorporate these with the existing records in order to bring the cost records up to date. The information for track and special trackwork is kept on cards which are revised as explained below. (See Fig. 10.)

Taking up first straight track, the situation is complicated somewhat by the fact that there are still in existence on the Montreal Tramways system several different kinds of old straight-track construction. A record of each type is maintained on a separate card, with the result that there may be three or four cards to record the work between any two points of intersection. When a complete renewal of a piece of track between any two points of intersection is made, a new type of track construction is installed, which we know as 115-CG. This symbol indicates that the rail used is 115 lb. and that the track has concrete foundation, with slab and granite block paving. When the new work is installed, one card is substituted for the three or four previously used, which are destroyed, the history of the replaced types of construction being inscribed on the new cards.



MONTREAL TRAMWAYS COMPANY — ENGINEERING DEPARTMENT — FINAL REPORT TRACK CONSTRUCTION — Form 29

This Report to be sent to Drawing Office as soon as work is finished.

W. O. 4192 — Received in drawing office Nov 18/22 — Date Nov 16/22

Street St Lawrence & E. from Mt Royal Ave to Sherbrooke

Work Started July 4th/22 — Work Finished Nov 16/22

Estimated Cost $ 162 449.20 — Actual Cost $ 121 275.00

Information to show kind of materials

Intersections Installed None — Drawing No None — Date

Taken out None

Rails laid 112# New — Rails Removed 85# Scrap

Joints E.W. 115# New — Elec. Bonds 115# New

Tie plates Std New — Tie Rods 5/8" New — Spikes 5/8" G.I. New

Washers Nut 1" New — Screw Dogs Harm 6" — No Guards 4 — Complete

Ties Std New — Special Ties None — Re-laid None

TRACK CONSTRUCTION	Kind of Rails	From Stations	To Stations	Joints	RAIL Laid	RAIL Taken up	EXCAVATION BY Above up	EXCAVATION BY Below up
Centre line	115 lbs	78+00	150+64	116 EK	115# New	85# Scrap	M.T.Co.	M.T.Co.
Ballast to passings	Dust & Sand	78+00	150+64					

PAVING	Kind	From	To	Blocks Supplied by	Concreting by	Paving by	Grouting by	Kind of Grout
Between rails	Granite	78+00	150+64	M.T.Co.	M.T.Co.	M.T.Co.	M.T.Co.	Sand
Outer Strip	"	78+00	150+64	"	"	"	"	Dust Cement
Paving on Curves	"	78+00	150+64	"	"	"	"	

Meter No. 53240

Reading Start 465

" Finish 1458

Consumption 993 Cu. Ft. — Total 9¢

Lines given by Engineers M.T.Co. — Grades given by Engineers M.T.Co.

Temporary Track Used on West Side as Double Track.

Remarks Concrete Slab Laid 8", Paving Base Laid 6". Sand Cushion and Granite Blocks New used.

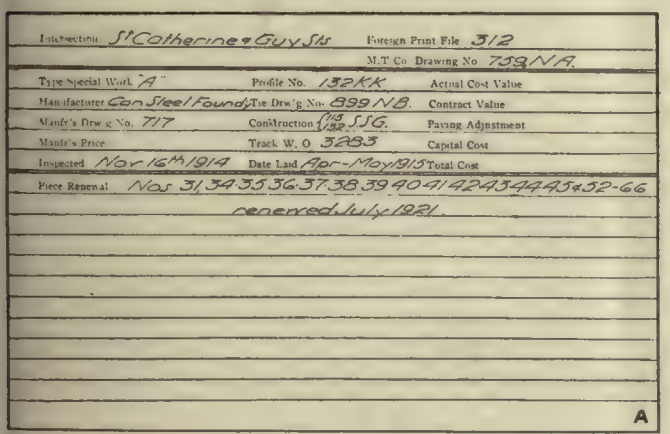
Foreman H. Scott

Checker J. Scanlon

Fig. 9—Final Report on Track Construction

One side of the card is devoted to the history of the track, and here are given the location, year of installation, number of miles of single track, work order number, types of new and old construction, starting and finishing dates of the work, and name of the foreman under whose direct supervision the work was done.

The total cost of the work is then compiled and split up under the following headings: Actual cost value,



Intersection St Catherine & Guy Sts — Foreign Print File 312

M.T Co. Drawing No 739 NA

Type Special Work "A" — Profile No. 132 KK — Actual Cost Value

Manufacturer Can Steel Foundry — Tie Drw'g No. 899 NB. — Contract Value

Manfr's Drw'g No. 717 — Construction 115/132 SSG. — Paving Adjustment

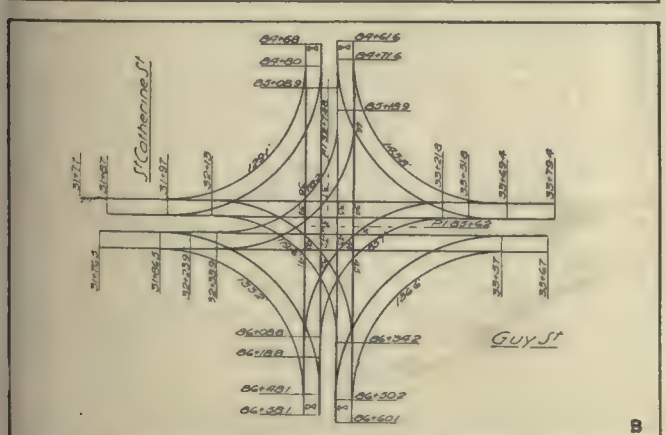
Manfr's Price — Track W. O. 3283 — Capital Cost

Inspected Nov 16th 1914 — Date Laid Apr-May 1915 — Total Cost

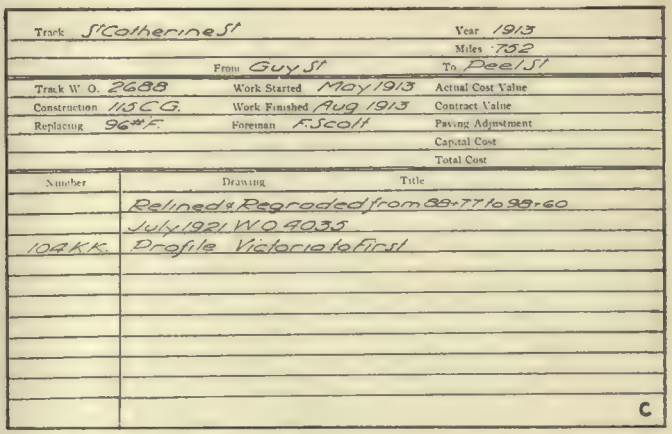
Piece Renewal Nos 31,34 35 36 37 38 39 40 41 42 43 44 45 & 52-66

renewed July 1921.

A



B



Track St Catherine St — Year 1913

Miles .752

From Guy St — To Peel St

Track W. O. 2688 — Work Started May 1913 — Actual Cost Value

Construction 115 CG. — Work Finished Aug 1913 — Contract Value

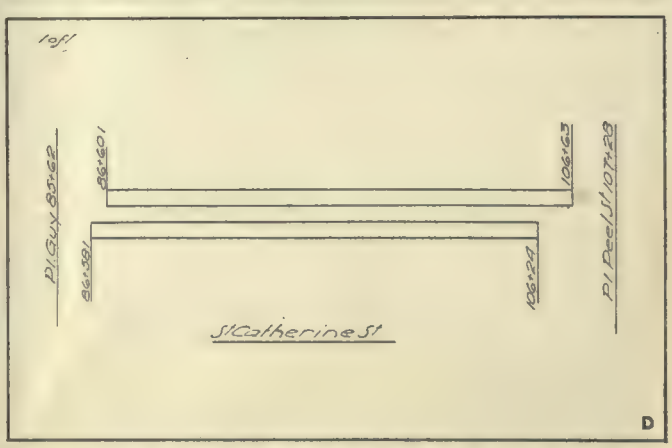
Replacing 96# F. — Foreman F. Scott — Paving Adjustment

Capital Cost

Total Cost

Number	Drawing	Title
	Relined & Regraded from 88+77 to 99+60	
	July 1921 W.O. 4035	
104 KK.	Profile Victoria to first	

C



D

Fig. 10—A, Face of Special Trackwork Record Card. B, Back of Same. C, Face of Straight Track Record Card. D, Back of Same

contract value, paving adjustment, capital cost and total cost. At the bottom of the card space is reserved for the profile drawing numbers, etc.

The reverse of the card is devoted to a diagram of the piece of track. This is made in color and shows the section of rail used, the chainages, the beginning and end of the work and the points of intersection.

Recording Special Trackwork

All intersections, turnouts, crossovers and guarded curves are classified as special trackwork. Each piece of special trackwork is recorded on a separate card. On the back of the card is given a drawing showing the number and length of curves, chainages to switch points, end of combination rails, sections of rail used and total length of single track through the intersection. The different types and weights of rail section are illustrated by different colors of ink.

On the face of the card for special trackwork are

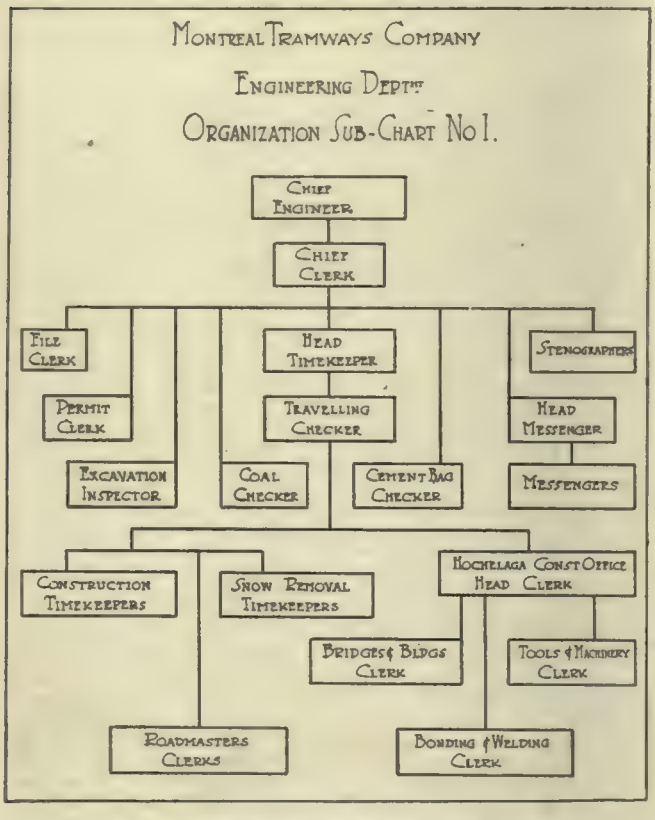


Fig. 11—Organization Chart for Record Section of Engineering Department

noted the point of intersection, the foreign print number or manufacturer's drawing number, the Montreal Tramways' drawing number, the type of special trackwork used, the name of the manufacturer, the price and the date of inspection. There are also noted the city of Montreal's profile drawing numbers, the tie diagram numbers, the work order number and the date of installation of the intersection.

A space is reserved at the bottom of the card for memoranda of piece renewals. If at any time it is necessary to renew a switch, mate or crossing, notation is made under the heading "Piece Renewal," giving the number of pieces renewed, the section of rail used and the installation date. There is also a column reserved to show the intersection installation cost and analysis thereof.

In this connection it is important to note that in 1917 a complete valuation was made of the Montreal Tramways system. This gives a starting point for the cumulative cost records. Thus, as each work order is completed and the cost data are audited and turned in, an adjustment of the contract valuation is made, either increasing or decreasing the capital, as the case may require. This facilitates an easy and accurate valuation of track and roadbed throughout the system at any time.

If an intersection is completely renewed, a new card showing the new work is substituted for the old card.

From what has been said it is apparent that the maintenance of this card record system is not a difficult matter and it furnishes a very complete record of track.

Track Maintenance Costs

The costs of track maintenance are compiled in practically the same manner as the costs on work orders, with the exception that final reports are not made up. The information required on labor and material distribution is contained in semi-monthly reports. The renewal or replacement of special trackwork pieces, however, is covered by special reports, giving detailed information to the superintendent of tracks.

The system is divided into two divisions, east and west, under the direct supervision of division roadmasters, who are assisted by a clerk and a traveling timekeeper.

Records of Sub-Departments

The records described above refer to track and these are kept at the main office. It happens that the clerical staff and foremen connected with the sub-departments of bridges and buildings, tools and machinery, and bonding, welding and grinding are housed in a separate building located about 2 miles from the head office, which is in a central part of the city. The records of these sub-departments are maintained separately in this building, so as to keep these records in close relation with the actual work, for under the same roof are also contained the machine shops, carpenter shops, storeroom, and bonding, welding and grinding plant and outfit.

The instructions to the clerical staff quoted on page 759 indicate the method of record keeping and the routine followed in these sub-departments.

Organization

Fig. 11 shows a chart of the organization force which carries out the work described in the preceding pages, including some items not mentioned specifically. The titles given will, however, indicate the duties of the men in charge of these items.

During the course of the construction season it is necessary to utilize the services of several temporary timekeepers in addition to the permanent staff, who are also employed on snow-removal work during the winter.

Timekeepers are broken in on the work gradually. A green timekeeper is given a copy of the "blue book," or instructions to checkers, together with a list of the names and titles of officials and other members of the staff and a telephone list showing office locations. He is first thoroughly drilled in a correct interpretation of the instructions. The final destination of all reports and the process of checking and auditing are demonstrated to him. He is then taken out on the work and introduced to all other timekeepers, foremen or members of the staff with whom he will come in contact and obtains a general idea of the location of shops,

The Duties of Each Clerk Are Systematized

DUTIES OF CLERK IN CHARGE BRIDGES AND BUILDINGS

1. Material requisitions for carpenters, plumbers, bricklayers, painters (B. & B. department).
2. Posting material requisitions in ledger for cost distribution and reference for final reports.
3. Pricing above mentioned material.
4. Compiling lumber records in ledger.
5. Keeping price book up to date.
6. Compiling final reports for B. & B. department.
7. Compiling fortnightly statement for B & B. department.
8. Compiling daily time reports for B. & B. department.
9. Posting daily time reports in ledger for cost distribution.
10. Checking distribution record for B. & B. department with stores department record.
11. Daily working force report (gang location).
12. Stationery room records.

DUTIES OF CLERK IN CHARGE TOOLS AND MACHINERY

1. Material requisitions for tools and machinery.
2. Posting material requisitions in ledger for cost distribution and final reports.
3. Pricing above-mentioned material.
4. Keeping price book up to date.
5. Keeping T. & M. ledger.
6. Compiling final reports for T. & M.
7. Compiling fortnightly statement.
8. Making out daily time reports.
9. Posting daily time reports in ledger.
10. Checking up requisitions for T. & M. against stores department records.
11. Posting tool ledger account.
12. Field work—water meter reading, Western Division.

DUTIES OF CLERK IN CHARGE BONDING, WELDING AND GRINDING

1. Material requisitions for bonders, welders and grinders.
2. Posting material requisitions in ledger for cost distribution and final reports.
3. Pricing above-mentioned material.
4. Keeping price book up to date.
5. Compiling final reports for bonders, welders and grinders.
6. Compiling fortnightly statement.
7. Making out daily time reports.
8. Posting daily time reports in ledger for cost distribution.
9. Reports of work done by bonders, welders and grinders.
10. Compiling electric weld joint record (ledger).
11. Compiling record of oxygen and acetylene consumption.
12. Field work—water meter reading, Eastern Division.

storerooms, etc. A few days as an understudy to an experienced timekeeper enables him to pick up a practical knowledge of labor distribution and field routine, after which he is detailed to cover a work order. Timekeepers are continually in touch with the head office by telephone, messenger and through the medium of the chief clerk, traveling checker and cement bag checker who cover the outside work at frequent intervals.

Montreal Tramways timekeepers and material checkers cover also, when required, the inspection of stations and platforms, cattleguards, fencing and culverts. During heavy weather they are frequently called in from the field to cross check the delivery of material against the records of the stores department. The distribution of coal during the winter months to switch and hillmen's shanties is covered by a checker. As a high percentage of trackwork is carried on at night, checkers are subject to call for night work.

The necessary overtime for night work is distributed evenly as far as possible with due consideration to the ability and experience of the checker.

Liberty Bell Route Inaugurates Chair Car Service

A PLEASING improvement in the Philadelphia service of the Lehigh Valley Transit Company, operating over the Liberty Bell route, consists of giving chair-car service on two of the round trips daily. The company operates a limited service every hour between Allentown and Philadelphia. The run is made in one hour and fifty-seven minutes, which is quicker than competing steam roads. The one-way fare is $1.66, and an extra charge of 50 cents is made for a seat in the chair cars.







No. 1—Type 700 Car Before Remodeling. No. 2—Exterior of Remodeled Chair Car. No. 3—Interior of Chair Car Compartment

In order to provide the additional cars necessary for this service some of the company's type 700 center-entrance cars were remodeled. Accompanying illustrations show these cars before and after the work of reconstruction took place. The work of remodeling consisted of cutting out the well in the center part of the car, but leaving the ramp and center sills to form a truss. The side sills were straightened out and an angle iron was added for a support. The floor in the car was relaid to make it level. Side panels were filled in where the center doors originally were, and two additional windows were added in the center. Steps and trapdoors were installed at diagonally opposite ends of the car, and a glass partition was placed between the smoker and parlor compartments. In general, the electrical equipment underneath the car was not relocated but was blocked up during reconstruction and until proper supports were provided.

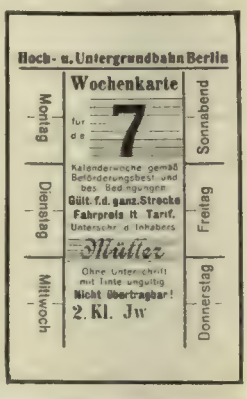
This reconstruction gives an all-steel car of 50 ft. over all with a width of 8 ft. 9 in., weighing 69,180 lb. The chairs used are of special design, being willow upholstered with spring seats. There are eighteen chairs in the passenger compartment and five in the smoking compartment. A mouse-colored rug is used over the entire floor in the parlor compartment, and the platform has been arranged to provide an observation compartment in the smoker.

The officials of the railway report that the service has proved quite popular, and that there has been a considerable increase in passenger traffic due to its inauguration.

Zone Fares and Transferable Short-Ride Weekly Cards for Berlin

THE Berlin (Germany) Street Railways has always been an exception to the European rule of graduated fares for large cities, although the Berlin rapid transit lines are on a basis of short-haul and long-haul fares as well as two classes of fares. No longer ago than October, 1922, in a signed article, De Leonhard





Weekly Passes Used on Surface and Elevated Lines in Berlin. They Are Good for Only Two Rides a Day for Six Weekdays

Adler, manager of the system, wrote that Berlin conditions did not seem to encourage the use of a graduated fare. He said that the average surface car haul was only 3.9 km. (2.4 miles), whereas fare collection difficulties would not permit a lesser short-haul ride than 2.5 to 3 km. (1.8 to 1.9 miles). An extensive zone fare would drive the public to the cheaper Stadtbahn (the Prussian Government's belt lines).

However, the skyrocket increases in Berlin city fares have had such disastrous influence on traffic that the city-owned street railways are prepared to try at least a short-haul fare and to add also a modification of the old-time weekly card. For example: In the spring of 1922 the surface cars carried 2,000,000 riders a day, but by October, 1922, the traffic had gone down to 1,050,000.

It is almost useless to state fares except as ratios to explain the innovations. On Jan. 30, 1923, the standard fare was advanced to 150 marks, or 1,500 times the pre-war rate! A ticket, including transfer to either surface or elevated lines, cost 220 marks. Unlimited-ride monthly cards of non-transferable type cost 9,000 marks if good on one line only, 12,000 marks when good on three lines and 24,000 marks on the system. Monthly cards for students cost 2,800 marks. Approximately half rates (80 marks) for single trips apply to children between the ages of six and fourteen years, students and apprentices between the ages of fourteen and seventeen years and crippled veterans.

New Zone Fares and Weekly Card for Short Riders

The foregoing kinds of fares are of the types formerly standard. To these was added on Jan. 8 a system of zone fares for trial on Routes 9, 16 and 116. The routes are divided into sections averaging 3 km. (1.9 miles) and the fare first charged was 50 marks. This was raised to 100 marks on Jan. 30, but this sum is of course less than the standard fare. Although there is an extraordinary proportion of overlapping routes in Berlin, the zone fares do not apply to other cars on the same streets.

The second innovation, made on Jan. 8, may be described as a short-haul weekly card, differing from the season tickets or passes in being transferable and in being valid for only a limited number of rides. The purpose of this card is to encourage short rides in the business sections. The test is being made with 1.5 km. (0.93 mile) sections on all routes radiating from Alexanderplatz and Potsdamerplatz respectively. These cards were placed on sale for 420 marks, or 35 marks for each of the twelve weekly rides possible—a reduction from the 70 marks standard fare and the 50 marks single short-haul fare, then in force. The cards are not valid on Sundays, but may be used on weekday holidays, thereby assuring twelve rides if wanted. There is no rebate for rides not taken. Cards are for sale on the Saturday before week of use. The punch made by the conductor on the first ride determines the section on which the card may be used the rest of the week. One of these cards is reproduced, together with the corresponding weekly card used on the Berlin Elevated.

On the surface weekly ticket the numbers 5 to 19 at the top of the ticket, overprinted with 1923, indicate the week covered by the ticket, as explained in a schedule on the back of the ticket. The letters "a" to "m" refer to the twelve routes on which the ticket may be used. The large letters at the bottom and sides of the ticket, "Mo," "Di," etc., refer to the days of the week, Monday, Tuesday and so on.

The elevated weekly ticket is much simpler as there is only one route. It, however, is non-transferable and the purchaser must sign his name in the lower ruled space in the center space on the card. The "7" in the upper space indicates the seventh week of 1923.

Signaling on the Frankford Elevated—II

The Interlocking Features Are Taken Up in This Article, as Well as the Speed Control Signals Which Form a Special Feature of the Installation—Junction with Market Street Line Involved Unusual Problems

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Automatic Train Stop, Color Light Signals, and Switch and Lock Movement, Electro-Pneumatic Interlocking, on Frankford Elevated

IN THE issue of this paper for April 28, 1923, page 711, the writer explained the layout of the signal system of the Frankford Elevated line, in Philadelphia. He left the subject with an account of the air supply system. There remained to be covered the switch interlocking arrangements and the special problems involved in the connection at Front and Market Streets with the Market Street subway-elevated line of the Philadelphia Rapid Transit Company.

The interlocking plants govern the switches, the "dwarfs," the home signals and, except where the signal is next to the station, they also govern the approach signals. Where a cross-over is adjacent to a station the interlocking governs the approach signal on the side away from the station. The valves controlling the air supply to the switches are of the cut-off type and when the movement is completed they cut off the supply of air to the pistons and thus eliminate the loss of air experienced when the pistons are kept charged at full pressure. Because of restricted space these valves are mounted on a special bracket fastened outside of the bench walk.

Signals for operation in the normal direction controlled by the interlocking plant are of the semi-automatic type; that is, they may be thrown to indicate "stop," but when thrown to the reverse position they act as automatic signals and permit a train to proceed only when track conditions are favorable. Each is equipped with an illuminated dial 7 in. in diameter, bearing the letter T in white on a dark background. The operating rules forbid passing a tower-controlled signal displaying a red light without a special call from the towerman. Accordingly, mounted on the mast is a permissive or "call-on" signal, consisting of a yellow light 5 in. in diameter. "Permissives" and "dwarfs" are non-automatic. They are manually controlled and give a proceed sign only when their controller is operated. Their range is 500 ft. as against 1,000 ft. for the signals for normal operation.

The interlocking machines are 110-volt, a.c., electro-pneumatic. Each machine is inclosed in a steel case having separate, removable doors for each section, to give access to the interior. Signal and switch levers are painted red and black respectively, and project in opposite directions. Levers are equipped with latches to prevent accidental movement, and there is the usual mechanical interlocking between levers. This locking makes it impossible to move a lever until other levers

interlocked with it have been thrown to the correct position. Movement of a lever immediately locks the other levers in position before energy can be applied to the unit controlled, and release of other levers cannot be effected until the lever has been thrown to the end of its travel. This locking prevents the throwing of a switch until the signals governing passage over it indicate danger, and in the same way it prevents giving a proceed signal over a switch until the switch has been locked in the proper position and all opposing signals have been thrown to the "stop" position.

For each spare lever, and where space is left for the future installation of a lever, room is left in the locking bed for one cross-locking bar and one longitudinal bar for the full length of the machine.

Electric Lock for Switches and Signals

Sectional route locking is provided by equipping each switch lever with an electric lock which prevents the moving of the switch as long as any part of the train is on the section. It is also provided with an indication lock, circuit controlled, so that when the lever is thrown the movement cannot be completed, and thus the mechanical locking affecting other levers be released, until the switch has been moved to and locked in the position corresponding to the position of the lever. Each signal lever is equipped with a similar lock, circuit controlled, so that when the lever is thrown toward normal the movement cannot be completed until the controlling relays for all signals, including permissive, directly controlled and indirectly controlled, have assumed their most restrictive position. The circuits for the signals, as distinguished from the circuits for their levers or relays, are also controlled through relays that positively repeat the position of the switch.

Permissive signals are controlled by a button mounted on the front of the machine and placed directly below the lever for the semi-automatic signal on which the "permissive" is mounted. This button is so interlocked with the lever that the circuit of the "permissive" cannot be completed through its controller until the lever has been reversed. The button also depresses the trip.

Electric locking is also provided to prevent taking away or changing a route after a train has entered the approach sections and the motorman has been given a proceed signal. Under certain restrictions the approach locking can be cut out. The release is by a clockwork mechanism which permits throwing the switch only after the lapse of a predetermined period. This period is adjustable, but the time is made sufficiently long to insure that the train will be brought to a stop before the switch can be moved. Locking which performs the same function is provided in connection with all "dwarfs" and with certain semi-automatic signals for which approach locking is not provided. This, however, is always effective, and is not dependent on the presence of a train in the approach section. This locking has automatic time release.

There is a sealed clockwork release for each electric lock on switch levers. This makes it possible to throw a switch when a car is on the section, but only after the seal has been broken, and it is impossible to give any proceed signal other than a permissive over a switch unlocked in this way.

Under each switch lever is a visual indicator of the electric-light type, which indicates by a green light that the track circuit controlling the lever is unoccupied and that the lever may be moved. Under each signal lever controlling a semi-automatic signal is a similar indicator which shows by a green light that the track circuit controlling the semi-automatic signal is unoccupied. It is also provided with a red light. When the lever is thrown this light indicates by a flash that the relay controlling the signal has responded. Incidentally if a train is on the section and the signal therefor indicates "stop," although the lever has been reversed, this light will give a continuous indication.



Color-Light Signals at Torresdale Street Electro-Pneumatic Interlocking



Another Installation of Color-Light Signal at Interlocking on the Frankford Elevated

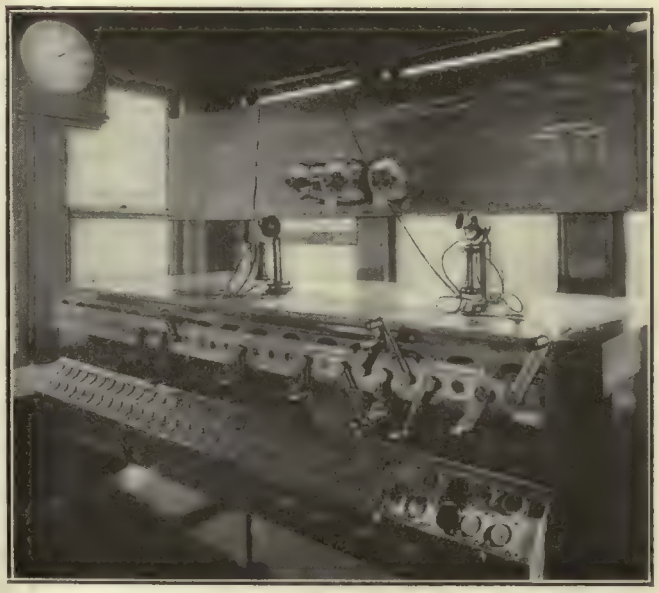
Providing for Reverse-Direction Traffic

There are four traffic levers on each machine. Each lever in conjunction with a similar lever in an adjacent tower permits the establishment of a reverse direction of traffic on a track between the two towers, but only when the levers controlling the signals at the entrance to the controlled territory are normal and the signals indicate stop and at the same time the controlled territory is unoccupied. They are provided with locking which does not restrict non-conflicting train movements, but permits following trains in the established direction

at close intervals. Under each traffic lever is a visual indicator which shows by a green light when conditions are proper for change in direction of traffic, and the lever may be reversed.

Mounted on an angle iron frame directly above each machine is an illuminated model showing tracks, track sections, signals, and other features of the interlocked section. Each track circuit on the model is colored sufficiently distinctive to differentiate adjacent sections. It is also indicated by a round spotlight located approximately at the middle of the section it repeats and which burns only when the track section is unoccupied. The model has one light for each track section within interlocking limits, one for each of the approach blocks and one for the receding track territory controlling the home signal at the entrance to the switch.

Near each machine is a switch panel carrying the following instruments: one voltmeter for the 110-volt mains, one air gage, two ground detectors and one switch for tower lighting.



Electro-Pneumatic Interlocking Machine, with Lever Light Indicators and Illuminated Track Model and Clockwork Time Releases

Special Problem at Front and Arch Junction

Special treatment was found necessary for the junction at Front and Arch Streets, between the line from Frankford and that from the ferries. At a junction point the signal layout must be such as to insure a specially high track capacity. It is true that, except for interference between trains running in opposite directions, if trains are run to schedule there will be no more congestion at a junction point than at other points of the line operating the same schedule, but it is also true that on a rapid-transit line trains cannot be run exactly to schedule. One train will stop at a station for say ten seconds, while the following train may easily be held for as long as ninety seconds. By proper dispatching at a number of points these differences may to a certain extent be smoothed out.

However, the junction at Front and Arch Streets is next to the Market Street station, which is served by the ferries of the shore lines of the Pennsylvania and Reading Railroads. During the summer these roads operate a frequent ferry service and most of their passengers take the elevated cars. It frequently happens that when a train enters a station there will be waiting on the platform the passenger loads from three ferry boats, and while these are loading on the train a fourth boat arrives and delays the train even further. When the next train arrives the platform is empty. Delays of trains approaching junction points are unavoidable, and if the signals cannot handle the trains as they arrive from the two lines there will be congestion.

The necessity for capacity at the Front and Arch Streets junction is accentuated by the fact that there will be interference between trains going in opposite directions. The tracks for Frankford and those from the ferries cross each other at grade. This interference delays the service on one line and, therefore, of all cars in each direction that pass the junction. The signal installation must be such as to handle, without delay, trains running at very close intervals.



Electro-Pneumatic Interlocking, with Switch and Lock Movement, and Color Light Signals at Dauphin Street, on Frankford Elevated. Inset, Close-Up View of Switch and Lock Movement on Frankford Elevated

The grade and alignment of the road at this point make it difficult to signal the line for high capacity. Rules for laying out signals call for rear-end protection not less than the distance necessary to stop a train running at the highest attainable speed. A line where the stations are at the tops of grades is easy to signal for close traffic. On the down grades from the stations the block lengths must be long but the speeds are high so that heavy traffic can pass. On the up grades into the stations the speeds are low but the block lengths are short. Either of these combinations permits close running.

However, when the stations are at the bottoms of grades it is difficult to signal for high capacity. The trains can reach a high speed on the down grade, so that with the ordinary methods of signaling very long block lengths are necessary. Practically, on a steep down grade terminated by a station, the trains actually run at a very low speed as the motorman is afraid to let his train out of control. The combination of low speed and long blocks prevents close running.

The grade and alignment at this point are such as to present to the trains from Frankford a danger condition which does not exist to the same extent for the trains from the ferries. As the ferry trains start from Market Street station they immediately encounter a curve of 140 ft. radius, with a total angle of 180 deg. by which the road reaches Arch Street. This curve terminates in a 5 per cent down grade leading into the subway. At the lower end of this grade is a curve of 200 ft. radius, with a total angle of 90 deg. at the end of which is the station. While these conditions are extreme, no accident has occurred here in the fifteen years of operation. The curve of 140 ft. radius is within full sight of the motorman as he starts from Market Street and he will not accelerate rapidly to it or run fast around it. Before the rear of his train is off the curve he is well down the grade and close to the 200-ft. radius curve. The layout itself guards against excessive speed on the grade.

For the trains from Frankford a different condition is presented. The grade terminates a long straight run. At the beginning of the grade is a 2.35 per cent slope; then there is one of 4.6 per cent which leads into the 5 per cent slope, at the lower end of which is the curve into the station. Except for the curve at the foot there are no natural obstacles to high-speed running and it would be easy for a motorman to attain a speed on the grade from which it would be impossible to brake to a speed safe for the curve. The blocks on the curve should be long to avoid rear-end collisions. On the other hand, the trains must run slow to avoid disaster on the curve. With the usual signal layout the track capacity would be low, whereas, as has previously been pointed out, a high capacity is essential. Moreover the usual signal layout does not prevent high speeds. A signal system was necessary which would guarantee safety and capacity.

Speed Control Signals Solve the Difficulty

The solution determined upon was to provide double overlap so as to space the trains closer and to install "speed control" signals. These are signals which normally display a danger indication, but are equipped with a time element which causes them to display a proceed signal a certain number of seconds after the time element has been energized. This time element is essentially a constant-speed motor.



High and Dwarf Color-Light Signals and Automatic Train Stops at Entrance to Market Street Subway, Junction of P. R. T. and Frankford Lines

The type of speed control usually installed is two-position, and has a single control. This is energized when the approaching train enters the block, immediately in advance of the signal. It is entirely effective in limiting the speed, but it is open to the objection that it keeps the speed of the trains to too low a value and makes it impossible to get the traffic over the line. The motorman, seeing the danger signal ahead, takes no chances of being tripped but runs at such a low speed that the signal clears well ahead of him. Experience shows that the average speed of trains over a line equipped with this type of speed control is only about half the permissible speed, and this reduction in speed cuts into the capacity in about the same proportion.

The speed control signals decided on for this installation are three-position with two controls. The time element becomes energized when the front of the approaching train enters the second block in advance of the signal, and the yellow proceed signal is displayed a certain number of seconds thereafter unless before this time has elapsed the front of the train has entered the block immediately preceding the signal. If it has en-

tered this block the signal under consideration will continue to display red and its trip will continue raised until a predetermined period of time has passed, after the train has entered this last-named block. These two periods of time are independently adjustable.

Experience in New York, where this type of speed control signal was developed, show that where it is installed the speed of the trains is very close to the limit for which the signals are set. Trains usually pass the signals just at the instant they flash from yellow to green and the one ahead changes from red to yellow. If the train runs too fast and passes a signal before it changes to green, the motorman checks the speed only slightly and the next signal is reached just after it changes from red to yellow and from that to green. It is almost as if the motorman accepts the signals as a sporting challenge to run the train at the speed for which the signals are set.

A criticism against this type of signals is that they do not make high speeds impossible. Theoretically this criticism is true. If the motorman is running at the correct speed the nearest raised trip is always the second one in advance. It is possible for him to accelerate over this space at the maximum rate and to attain a high speed before he is tripped. However, this criticism is more academic than real. The signals normally indicate danger at all times of the day and in all conditions of traffic. The motormen come to accept them as part of the existing conditions just as they accept the stops at stations. It is as difficult to conceive of a motorman throwing on full power and running into a signal which he knows always indicates danger as it is for him instead of stopping at a station to rush through it at full speed when he sees a train stopping just beyond it.

To sum up, the speed control signals are such as to cause the motorman to run no faster than the predetermined speed but to encourage him to run close to it, and in this way to obtain full capacity for the grade.

It will be noticed that these special precautions cover the safe operation down the grade of trains running at close headway. They do not cover safety at the grade crossing. The precautions to this end are simple. The crossing movement is between trains from the ferries and trains to Frankford. Safety for this movement is insured by mechanical locking in the lever machine so that the switch cannot be thrown for the train to Frankford if the position of the switch on the other track permits the passage of a train from the ferries. Before the route can be set up for the west-bound train from the ferries, the switch on the east-bound track must first be thrown and locked so that the only east-bound movement possible is to the ferries and a crossing is impossible.

As was mentioned at the end of the preceding article the contractor for the signal system of the Frankford Elevated was the Union Switch & Signal Company. This applies to the features covered in the concluding article as well as those described earlier.

During the four days of the Easter holiday this year the railway, omnibus and tramway lines forming the "Underground Group" in London carried more than 16,000,000 passengers. On one day the number was 5,000,000. In 1922, as stated earlier in this paper, the tramway cars of the London County Council carried 726,000,000 passengers, a record for traffic and 36,000,000 more passengers than in 1921.

Galvanizing vs. Painting of Exposed Steel Structures

THE editors of the *Electrical World* have recently conducted a canvass regarding the relative merits of painting and galvanizing steel used in structures exposed to the weather. While no definite conclusions were drawn, a summary of advantages and disadvantages of both practices was prepared. This is given in substance below:

Galvanizing—Advantages

1. Where parts of the structure are not readily accessible or dangerous to life—for example, near live wires—galvanizing has advantages.
2. Where the structures are widely scattered and the cost of a careful inspection would be heavy, galvanizing is also advantageous.
3. Where a permanent installation of sufficient magnitude to warrant a company doing its own galvanizing is made, the cost of galvanizing adds only 20 to 30 per cent to the cost of the steel.
4. In fabricated structures where bolts are used galvanized parts have a longer life.
5. In some structures it is possible to use lighter steel if it is galvanized than if paint is used.
6. The length of life of the galvanizing is from eight to fifteen years as compared with two to four years for paint.

Galvanizing—Disadvantages

1. First cost is high—reports give figures varying from 30 per cent greater to nine times the cost of painting.
2. The quality of galvanizing varies, necessitating rigid specifications.
3. In certain locations — for example, in a damp, salty atmosphere and in a sulphur-laden atmosphere — galvanizing has a very short life, so that its application is somewhat limited.

Painting—Advantages

1. It is cheaper than galvanizing, and this makes it particularly advantageous for new installations in which the capital charge must be kept low until the load grows.
2. It costs little to have painting done by the normal line crew during odd moments.
3. Paint of different qualities can be found suited to peculiarities of the location of each structure as regards weather conditions, air conditions and a changeable environment.

Painting—Disadvantages

1. It is difficult to obtain paint of the proper quality for each application.
2. Two or more kinds of paint must be used to obtain good results.
3. Repainting must occur in from two to four years, and in many cases this is a very costly operation, particularly if structures are brushed or scraped before repainting.
4. Repainting of live structures is hazardous and it is difficult to "kill" substations or lines.

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17 per Cent Increase in Railway Competition

RECENT compilations of the National Automobile Chamber of Commerce show that in 1922 there were 12,239,114 motor vehicles registered, as against 10,464,005 in 1921, an increase of 17 per cent. The production of new motor vehicles in 1922 reached the startling total of 2,659,064, which passed the previous high mark of 1920 by 22 per cent. It was an increase of 60 per cent over the 1921 production.

The accompanying table giving the record of passenger car and motor truck production and the record of registration is something to contemplate. Where is the saturation point in the registration figures?

Indications for 1923, so far, are that production may exceed that of 1922. During April, 364,000 vehicles were manufactured and shipped, which is 66 per cent greater than April last year.

	Passenger Cars		Motor Trucks		Total Motor Vehicle
Year	Number	Wholesale Value	Number	Wholesale Value	Registration
1911.....	199,319	$240,770,000	10,655	$22,292,321	639,514
1912.....	356,000	335,000,000	22,000	43,000,000	944,000
1913.....	416,500	399,902,000	23,500	44,000,000	1,287,000
1914.....	534,679	413,859,379	25,375	45,098,464	1,711,339
1915.....	818,618	565,978,950	74,000	125,800,000	2,445,664
1916.....	1,493,617	797,469,353	90,000	157,500,000	3,512,996
1917.....	1,740,792	1,053,505,781	128,157	220,982,668	5,104,321
1918.....	926,388	801,937,925	227,250	434,168,992	6,146,617
1919.....	1,657,652	1,461,785,925	316,364	423,326,621	7,530,105
1920.....	1,883,158	1,809,170,963	322,039	423,756,715	9,177,129
1921.....	1,514,000	1,093,918,000	147,550	166,082,000	10,464,005
1922.....	2,406,396	1,567,003,041	252,668	222,635,324	12,239,114

Why One-Man Operation Is Popular in Binghamton

Better Service, Clean and Well-Painted Cars and Relatively Fewer Accidents Please the Public—The Passenger Revenue Increased 3 per Cent in 1922—Trainmen Prefer to Operate One-Man Cars

THE operation of one-man cars in many localities has not met with entire public approval, and the success of the Binghamton (N.Y.) Railway in avoiding the difficulties which have sometimes made such operation unpopular elsewhere is, therefore, worthy of note. All of the local service of this company, comprising nearly 90 per cent of the total daily number of trips, is now operated with one-man cars. These are, in the main, converted two-man cars, but on only one interurban line are two-man cars now used. Moreover, the public is well pleased with the service and has shown its approval by increased riding.

Several factors have contributed to produce this



Double Door Permits Simultaneous Loading and Unloading

situation. In the first place, one-man cars were inaugurated without any advance publicity. The management took pains to make no promises beforehand concerning improvement in the service, thus avoiding the risk of consequent dissatisfaction if it did not materialize. No opportunity was given to prejudiced persons to condemn the new cars without a trial. When they were ready the railway simply commenced operation of one-man cars, and left it to the public to judge them by actual performance.

Special care was taken that there should be no slowing up of service, as it was realized that such a thing would soon make the change very unpopular. Efforts to maintain speed have been so successful that with the same schedule for both types of operation the one-man cars are late less often than the two-man cars. At the same time particular attention has been given to the subject of maintenance, so that the service is reliable and the cars always present an attractive appearance inside and out, and every reasonable provision is made for the comfort of the passengers. The public has come to realize that it is getting a high-class service at a comparatively low rate of fare (6 cents).

The fact that there are no railroad crossings at grade is one feature that has been helpful in making one-man operation a success, as is also the fact that there is only one multiple-fare line. This goes to Endicott and uses two-man cars entirely. Another favorable circumstance is that no routes terminate in the congested district, all running through from one side of the town to the other, or in some cases looping near the center of the city. For that reason the problem of quickly changing ends at busy points with only one man to do the work has not arisen.

On the other hand, there are a number of local circumstances which tend to increase the difficulties of the operator of a one-man car. For example, all signals are thrown by hand. Many of the lines in Binghamton are single track after leaving the business section of the city, and the manipulation of the signals, therefore, makes considerable work. There are at the present time no electric switches, and hence switches, too, must be thrown by hand except at the intersection of Court and Chenango Streets, where a switchman is located during the rush hours. It is planned, however, in the near future to install an electric switch at this point.

No change whatever was made in the schedule speed when two-man cars were replaced by the one-man type. The present schedule varies from a little more than 8 m.p.h. on the slowest line to 11 m.p.h. on the fastest. All lines are checked during the entire period of operation by inspectors stationed at Court and State Streets. A summary of these checks showed that on twenty-two week days chosen at random and representing all sorts of conditions, the one-man cars were late less frequently than were the two-man cars.

In these checks one and a half minutes variation from schedule was the maximum allowed, and all cars two minutes late were so recorded. On that basis the one-man cars made a performance well over 99 per cent, while the two-man cars were only about 98 per cent on time. The average layover at the outer ends of the various lines was between two and three minutes, and it has been found that this time is sufficient for the operator of a one-man car to change ends. To facilitate this work all such cars have been equipped with fenders or life guards at both ends. A change of schedule was therefore unnecessary, and experience has proved that the one-man car can be operated at the same speed as the two-man, or even a little faster.

Pay-as-you-enter operation prevails on all lines, and the railway has installed a number of devices to increase speed. A large number prominently displayed and illuminated at night indicates at a distance what route a car is following, and all front entrance cars are plainly marked, as can be seen in the accompanying picture. The single-truck cars, although equipped with standard safety devices, are not the typical safety car, but are

of somewhat heavier construction and have a doorway of double width. This permits simultaneous loading and unloading and makes for more rapid service. On all cars except those of the 500 type, however, the controller and doors are interlocked and the latter manually operated. It is claimed that a quicker get-away can be obtained by leaving the controller handle on the first point and starting the car by closing the door than is possible when the door closing, brake release and power application have to be done successively.

There has been a reduction in the relative number of accidents since the inauguration of one-man service in Binghamton. Comparing the years 1920 and 1922, there has been a gain in the number of motor vehicles licensed in Broome County from about 7,000 to 16,000, or nearly 130 per cent. At the same time the number of collisions between street cars and automobiles has increased only 19 per cent. Moreover, there has been a reduction in the number of boarding and alighting accidents so that the net result is that, in spite of the tremendous growth of automobile traffic, accidents in 1922 were only 17 per cent more than in 1920. The relatively smaller number of accidents at the present time is attributed by the company to the door interlocking devices and the fact that on and off movement of passengers is directly under the eye of the motorman.

A large part of the success of the one-man cars is no doubt due to the attitude of the trainmen, who prefer them to the older type cars. Platform wages are 5 cents an hour higher in order to compensate for the slightly greater amount of work to be done. Johnson fare boxes are used with overhead registers. The fare being six cents, the operator must be prepared to make change and must grind down the box and ring the register. Tokens are not used to any great extent because they are sold without reduction in price.

In addition to the work already mentioned, the operator of a one-man car must record on his daily report card the register reading at the end of each half-trip, and upon the completion of his run the beginning and ending numbers of fare box and register, and the number of transfers, free riders, etc. He must also fill out a memorandum of any mechanical defects found and a report of the number of trips made with the car. This latter is for use of the shop department in figuring mileage for inspection and overhauling. It appears from the foregoing, therefore, that the keeping of necessary records has not been sacrified to make the cars popular with the trainmen.

The popularity of the one-man operation with the public is not due directly to the cars themselves, but to the fact that the saving in operating costs has made possible an unusually high standard of maintenance. Every car is cleaned before it is sent out of the barn in the morning. The interior is swept and sprayed with West's disinfectant. The exterior is dry wiped every night and treated with Brooks renovator every sixty days.

Forty-three new cars have been purchased by the Binghamton Railway since 1916. A portion of these are single-truck cars, resembling the Birney car in design but of heavier construction, and with the wider doors described above. This car has a 9-ft. 6-in. wheelbase, weighs 19,000 lb. and seats twenty-eight people. It is claimed that the more sturdy construction saves maintenance costs, and permits carrying larger loads.

The non-rush time-table calls for forty-two cars on the road, and twenty-one additional trippers are sent out in the late afternoon. Even with this amount of service it is important to carry as many passengers per car as can be done without undue crowding. The single-truck cars of the 500 type can easily accommodate seventy-five persons.

More recently, however, the company has purchased double-truck equipment. The latest design, of which seven additional units have lately been acquired, is a steel car built by the Cincinnati Car Company, weighing 32,500 lb. and seating thirty-eight. It has been found that these cars carry about the same number of passengers when operated by one man as when operated by two men. The explanation of this lies in the fact that passengers tend to gather around the entrance whether at the front or at the back, and in either case some will move into the body of the car when urged to do so and some will not. Accordingly, the carrying capacity of the car does not vary greatly, no matter which way it is used.

All cars are equipped with electric heaters and thermostats. Center lighting is used with 94-watt lamps and an emergency storage battery to supply current to the red lights in the rear in case the trolley leaves the wire. Cars are inspected every 1,000 miles, and overhauled every 50,000 miles. Painting is done



Cars of This Type Are Used Successfully for One-Man Operation

regularly every second year, even though the car retains a fairly presentable appearance. Pratt & Lambert's standard Tuscan red is used.

The fact that the cars are clean, well heated, well lighted, well ventilated and bright and attractive looking has appealed to the people of Binghamton and stimulated the riding habit. Passenger revenue increased about 3 per cent in 1922 over the preceding year, and bus competition has been forestalled.

Traffic Congestion in Shanghai

SHANGHAI (China) claims to have the world's largest number of passengers carried annually per mile of track, 7,000,000. The total number increased from 11,000,000 in 1908 to 126,000,000 (21,750,000 first class) in 1922, with practically no increase in track mileage. The number of cars, however, increased from sixty-five to 194. The track mileage to day is only 2.43 per 100,000 population. In the period mentioned the annual car-mileage has trebled, i.e., increased from 2,000,000 to 6,000,000.

In the foreign settlement in Shanghai there are 15,000 public and private 'rickshas, 14,000 wheelbarrows, 3,000 motor cars and 2,164 hand carts.

Connection Triples Freight Business

THE Buffalo & Lake Erie Traction Company operates freight service between the cities of Buffalo, N. Y., and Erie, Pa., connecting with the Jamestown, Westfield & Northwestern Railroad at Westfield, N. Y. Until the latter part of last year, however, the two roads crossed, but had no connecting curve from one to the other. Through freight from points on one railway to destinations on the other had to be unloaded at the depot of the first road in Westfield, carted across town and reloaded onto the cars of the other road at the latter's depot. Whenever suggestions were made that a physical connection should be installed the authorities of Westfield raised the objection that it would make a freight yard of their town.

An agreement was finally reached, however, between the town authorities and the railway officials whereby the connecting curve was to be installed and if, after a fair trial, it was found to be a nuisance the companies practically promised to remove it. The connection was made on Nov. 6, 1922, and as a matter of fact there have been since that time fewer cars standing in the streets than formerly stood there, because through operation without the necessity of trans-shipping at Westfield is now possible.

The town authorities seem entirely satisfied with the new arrangement and the freight business has increased in a most gratifying way. Under the old conditions that part of the traffic handled by the Buffalo & Lake Erie Traction Company amounted to about $10,000 annually. At the present rate the business done in 1923 will be well over $30,000, and it is estimated that it will eventually develop to about $75,000 a year.

California Railway Situation Improving

IN ITS REPORT recently issued for the year ending June 30, 1922, the Railroad Commission of California sums up the electric railway situation there as follows:

"The street railways of the entire country, during the last number of years, have gone through a trying and difficult period. Costs and wages have shown a disproportionate increase compared with the increase in traffic, and the lack of normal traffic increase was due largely to the competition of the private and public automobile. Even a substantial increase in fares failed to keep some of the weaker companies in operation.

"It seems as though in California, at least, this critical period has come to an end. With the fall in costs and with the private automobile competition apparently close to the 'saturation point,' the interrupted normal curve of traffic increase appears to have returned to its original and upward tendency. This has had the effect of improving street and electric railway service during the last year; with proper operating economies a number of requested rate increases proved unnecessary in the commission's opinion; and in general, the street and electric railways are in a healthier condition than they have been for a considerable period of years.

"The installation of the one-man safety car has proved a distinct benefit from the standpoint of service and cost of operation in several communities. Experiments with new forms of tickets and commutation rates have proved satisfactory in several instances and there has been a further effort on the part of the commission in all rate cases to do away with unjustifiable discrimination between classes of service and communities."

The Readers' Forum

Not Practicable to Manufacture Left-Hand Thread Lamps

THE ARROW ELECTRIC COMPANY
HARTFORD, CONN., April 25, 1923.

To the Editors:

We have read the communication on the theft of lamps shown on page 650. Of course the left-hand screw thread on receptacles and the left-hand threading on lamps could not prevent the removal of lamps; it would simply make the lamps useless, and perhaps that fact might not be recognized in time to prevent the actual theft but would be found out afterward and the lamp destroyed.

There are several socket manufacturers making lock sockets. The type manufactured by P. & S., the H. T. Paiste Company, Bryant Electric Company, G. E. Company and ourselves is a positive lock. In other words, the lamp cannot be removed without the use of a special appliance, in our case a key. It also prevents lamps jarring or vibrating out of the sockets or receptacles, which we should think would be an added advantage as far as trains or electric cars are concerned.

A locking arrangement of this kind which prevents the removal of the lamp would, it seems to us, be a better proposition than an arrangement which would make it possible to remove the lamp but make the lamp useless. There would be a considerable amount of theft before it was discovered that these were useless.

Another point is the fact that we have had some experience with left-hand screw threads with the result that we will not handle sockets or receptacles using such a thread. They become mixed in manufacture and cause endless trouble in the field. It is almost impossible to keep them separate from standard parts, so regardless of the merits of the left-hand threading as against the positive lock, our company for one would not care to take on a proposition to manufacture sockets or receptacles with left-hand screw threads. We think this would also be the opinion of other manufacturers in our line. H. C. POND, Sales Manager.

Bayonet Sockets Would Prevent Lamp Thefts

THE DENVER TRAMWAY COMPANY
DENVER, COL., April 23, 1923.

To the Editors:

Referring to the letters published in your issues of March 24 and April 14 on the question of how to stop the theft of lamps on electric railway properties, I would be glad to give my idea on the subject. I might mention that my opinion is the result of thirteen years of continuous service in the lighting department of this company as foreman.

The lock sockets on series circuits are out of the question, as the additional time consumed in trouble shooting would cost more than the lamps by far. On multiple circuits sockets are twisted loose with added trouble for the maintenance man. The left-hand thread, as well as any over or under standard size sockets, would very likely have some effect in avoiding theft. This would necessitate a change in manufacture of lamp sockets, including the replacement of present installa-

tions. Furthermore, you will find a lot of different makes of sockets on the system that would make it hard to replace the screw portion only as the cost of tools for the makers to manufacture to fit these old types would prohibit this. The cost to change them alone would cost more than new sockets.

I would suggest the so-called double-contact bayonet socket and lamps of a size that would permit the socket manufacturers to use some of the dies and molds of present sockets for porcelain parts. This type would aid the trouble shooter in locating the bad lamp in a series circuit, as a change can be made faster than with the screw base. It would do away with the loose lamp trouble, which is a common thing on cars and poles, or any chattering condition. The destruction of sockets due to the arc drawn at the contact when connection is broken on a series burning lamp will be avoided.

The loss of time on the part of carhouse men when using pit lamps with extension cords is often due to a loose lamp in the circuit. The fire hazard of a series burning lamp circuit will be overcome, too, as loose lamps may ignite the installation of wires and result in a bad fire, in the event that the burning insulation drops in shavings or inflammable material. The safety in this respect alone would warrant the cost of gradual change on a whole system to the bayonet type, in addition to the gains in other respects.

Can any better solution be found?

W. C. WEFEL, Foreman.

Preventing Pavement Heaving Outside the Track Area

THE TOLEDO & WESTERN RAILROAD COMPANY
SYLVANIA, OHIO, April 26, 1923.

To the Editors:

I note on page 677 of the April 21 issue of the ELECTRIC RAILWAY JOURNAL an article relating to a design of pavement and substructure for street and interurban railways that overcomes the heaving of the pavement outside the track strip.

The general idea of this type of structure is not new. We do not claim that we originated it, although we built something over 1,000 ft. of track in the village of Metamora, Ohio, about 1915, designed in this same general way. Our track, however, was laid upon a 10-in. bed of concrete and a retaining curb of concrete 6 in. thick was built to the top surface of the paving. On the outside of this retaining curb we placed a ¾-in. premolded expansion joint the full length of the job. Transversely across the track we placed a ¾-in. expansion joint every 30 ft. In this trough of concrete we placed 2 in. of stone ballast, on top of which we laid our ties and rails to true grade. The crushed stone ballast was carried half way up the side of the tie and on top of this we then laid our concrete paving, which was reinforced with ⅛ in. steel mesh wire, with openings about 1 in. square.

This paving today is in very good shape, and the adjoining paving outside the track, which was of reinforced concrete, shows practically no heaving at any point. The only place where the paving is failing at all is at the rail joints, where all that is necessary is to tighten the bolts and perhaps put in some new bolts.

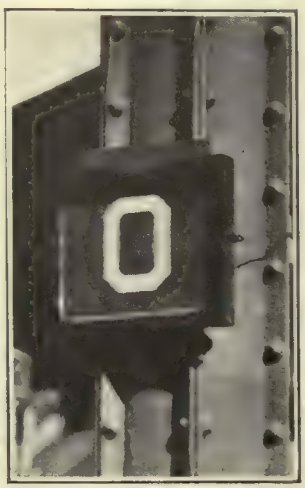
Our experience has shown us that this type of construction is very satisfactory, and it has been used to a great extent in Toledo, Ohio, on the tracks of the Community Traction Company.

We hope that your article will be carefully considered by other railways, for it surely is a design which will, we believe, be more satisfactory to municipal engineers, as well as to railway engineers themselves, than that type which makes the track structure an integral part of the street paving.

A. SWARTZ,
Manager for Receivers.

Heat Signs in Brooklyn

THE cars in Brooklyn are equipped with electric heaters with coils connected so that three intensities of heat can be obtained. The regulation of the heat is controlled from the main offices of the company. When the temperature is between 30 and 40 deg. one point of heat is used; between 20 and 30 deg. two points and below 20 deg. three points.



Heat Signs in Brooklyn

At all depots, switch towers, principal terminals, and other important points, signs similar to the one shown in the illustration are installed to indicate the proper amount of heat to be turned on. The readings of a number of thermometers at various points on the system are telephoned in to the main office, the proper amount of heat to be used is decided upon and notice is sent to the men in charge at the points where the signs are displayed. The card showing the proper number of points of heat—0, 1, 2 or 3—is then slipped into the frame. The trainmen are expected to observe these signs as their cars pass and make any necessary changes in the position of the heater switches that may be indicated by the signs.

Where the signs cannot be seen readily at night they are illuminated.

A Consolidated Delay Report

ONE of the steps recently taken by the Chicago Surface Lines to remove the cause of delays to its service has been to establish a single department where every delay to cars, no matter from what cause, is promptly reported, with the length of delay, cause, etc. As notices of these delays are received a record is made of them, and the record for each day is submitted to the management on the following day. At present this record is made up to 7 p.m. at night, but within the next few weeks, when the company has moved to its new offices, there will be a night service by which all delays which occur up to midnight on any day will be typewritten and manifolded for submission to the proper officials when they reach their desks early the next morning. The classifications used are as follows:

Time of delay (hour of the day).
Line.
Place of delay to service.
Run number.
Car number.
Direction.
Cause of delay to service.
Time cars were delayed: —— hours —— minutes.
Action taken to maintain or restore service.

Association News & Discussions

Fuel Determinations on Southern Pacific Steam Locomotives*

Road Tests on Oil-Burning Engines Set Standard for Comparison with Electric Locomotives—Discussion Shows Variation in Performance Computations

BY A. H. BABCOCK
Electrical Engineer, Southern Pacific Railroad, San Francisco, Calif.

WHENEVER electrification of steam railways on a large scale is advocated one of the principal arguments advanced is the large saving in fuel sure to result therefrom; in fact, this was the initial point of attack in the early days of the art, long before overtime of train and engine crews had become the very real expense in train operation it is today.

Fuel consumption of steam locomotives using coal cannot be analyzed as can that of electric locomotives, because it is impossible to obtain accurate measurements. When fuel oil is used, much more precise determinations are possible.

Engine No. 3,614 was selected because the records of the fuel bureau showed it to be an "average performer" in through freight service. It is of the 2-10-2 type, having cylinders 27½-in. long x 32-in. stroke. The weight on drivers is 273,000 lb., on the leading truck 29,000 lb. and on the trailing truck 46,000 lb. The rated tractive power is 63,300 lb. The tender is of the cylindrical type. It weighs empty 64,900 lb. and has a capacity of 3,120 gal. of fuel oil and 10,030 gal. of water. The weight of the tender loaded is 173,460 lb.

On every run a different engine crew handled the train while making the tests, the selection being by the usual "first in, first out" method standard on the railway. A trained observer rode the engine and made all the readings. The train weights, taken from the yardmaster's reports at the initial points, were corrected, during the runs, for fuel and water consumed.

It was found during the test runs that all engineers handled the trains very much alike, changing throttle or cutoff at or near the flags that had been placed at the reference points given in Fig. 1. Meter readings and times were recorded at all such points and at all starts and stops. In the final analysis all fuel measurements were reduced to 60 deg. F. Approximate correction factors on the train tonnage for water and fuel were made. The train tonnage, then, is the gross weight of the train, everything included.

The result is a complete record of fuel consumption. In the ordinary system of fuel records all fuel consumed in firing up, standing in the engine house and on the outgoing track

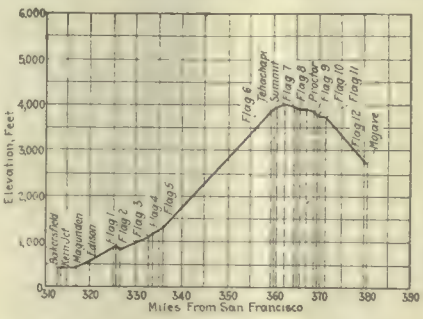


Fig. 1—Profile, Bakersfield to Mojave

up to the time the engineer assumes responsibility, i.e., thirty minutes before he is called to leave the terminal, is charged to engine house service; all consumed from that time until the engine is placed on the incoming track at the end of the run is charged to road service.

The fuel consumption may be divided into three groups:

1. Variation of fuel used in firing up, i.e., losses independent of the manner in which the engine is used after steam is raised.

2. Fuel burned in holding the engine under steam at terminals or on the road; i.e., losses dependent upon operating staff efficiency, and independent of speed.

3. Fuel consumption while moving; accelerating, running, entering and leaving sidings, etc., all of which depend largely upon tonnage and speed.

Group 1—For this determination the boiler was filled to ½-gage glass, with water at 120 deg. F. Steam for oil atomizer and blower was taken from the house steam lines until the boiler pressure reached 70 lb. gage. Fig. 2 shows fuel with respect to boiler water temperature and steam gage pressure. A second curve shows fuel consumption with time.

From other tests it has been determined that the atomizer and blower add 14 per cent to the fuel consumption. Therefore, if 14 per cent of the 84 gal. used up to the time when the boiler furnished its own steam for these purposes be added to the 119 gal. to bring the boiler pressure up to 200 lb. gage, we have 131 gal. total fuel used to raise steam with feed water at 120 deg. F.

Assuming that the fuel consumption is proportional to the rise in temperature, the fuel per degree rise is 0.522 gal.; from which then can be determined the value of storing the heat from boilers being blown down for washing, to use in firing up other engines for the road. Thus, to fire up with feed water from the hydrant at 60 deg. takes 167 gal. of oil; similarly for feed water at 180 deg., from a hot water boiler washing and filling plant, 96 gal. With fuel oil at $1.50 per bbl., the 71 gal. saved per engine fired up amounts to $2.54, but the saving is even more, because the time of turning an engine washed and filled with hot water is, by record, three and one-half hours less than the seven and one-half to eight hours required when cold water is used. Heavy power represents an investment worth at least $4 per hour. Hence the time saved adds $14 per engine turned to the fuel saved, and the total economy then is $16.54 per engine turned.

Group 2—The upward branch of the time-oil curve, Fig. 2, shows the fuel required to hold an engine under steam while standing in the engine house where these tests were made to be 17.4 gal. per hour, with no auxiliaries running. During the tests, placing this engine in the open yard, oil used averaged 36.6 gal. per hour. Air temperatures during this period ranged roughly from 20 deg. to 50 deg. F. Therefore, 19.2 gal. is the excess fuel consumed per engine-hour when standing in the open in ordinary weather.

Similarly, the fuel cost of standing on sidings with full tonnage train is found to be 42.8 gal. per hour. Since no steam was used for heating in either case, 6.2 gal. is the fuel cost per hour of maintaining air pressure in the train line, ready for service.

Group 3—To obtain results for the third group a more rigid treatment is necessary. R. S. Twogood, assistant engineer Southern Pacific Company, is responsible for the details of the test and the analysis of the results. In the reductions of the observations, the fuel oil density is taken at 0.96; the heat content, 18,000 B.t.u. per lb. The time, fuel meter reading, fuel temperature and location of train were recorded at

*Abstract of paper presented at the spring convention of the American Institute of Electrical Engineers, Pittsburgh, Pa., April 25, 1923.

every start, grade change or other important point, and stop. The speeds were determined by counting engine driver revolutions. All grade changes at other than station points were marked by white flags (see Fig. 1). Grade compensation for curvature is applied at 0.04 per cent grade per degree of curvature.

Total train resistance was based on Schmidt's tables, the value for level tangent track being taken at 7 lb. per ton. The average thermal efficiency was determined from the total horsepower-hours and the fuel burned when moving over sections where the total resistance was positive.

The average gallons of fuel per thousand ton-miles, in both directions, for every section of track, but not corrected for variations in speed within a section, are shown in Fig. 3 plotted against equivalent grade, wherein the curve as drawn has been adjusted to give fuel requirements for constant speed. Thus is shown the fuel cost of acceleration, and how, in the stop, provided the brakes are not used, a large proportion of the work done in accelera-

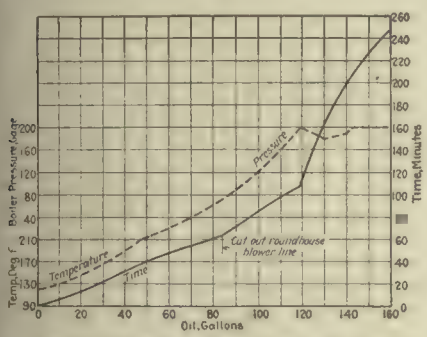


Fig 2—Fuel and Time Required for Firing Locomotive

tion is made useful in moving the train over the track. This is indicated by points on the left of the curve; points on the right show increase in fuel consumptions during acceleration.

The dotted part of the curve, for grades less than 0.5 per cent, either positive or negative, should not be depended on for accurate results, because there is no section of level track between Bakersfield and Mojave.

A locomotive of lower thermal efficiency would burn more fuel for any given grade than that shown on the curve. The result would be a flatter curve. On the other hand a locomotive of higher thermal efficiency would burn less fuel than shown and the curve would be steeper. It is, therefore, apparent that the slope of the curve is a function of the efficiency, and the steeper the curve the higher the efficiency.

From the curve, the fuel required per 1,000 ton-miles on a 2 per cent grade equals 38.0 gal., and for a 1 per cent grade equals 23.3 gal. The difference, 14.7 gal., represents the fuel burned moving a 1,000-ton train 1 mile over a 1 per cent grade without friction because both figures are for grade resistance plus train friction. The train friction being the same in each case, the difference is for a grade resistance of 1 per cent. A 1 per cent grade resistance is 20 lb. per ton. Then the work done in moving the given train 1 mile over a 1 per cent grade without friction equals 105,600,000 ft.-lb. This required 14.7 gal. of fuel or 1,647,082,080 ft.-lb. The thermal efficiency equals 6.41 per cent. This method of determining engine thermal efficiency is independent of train resistance at driver tires, which, at best, is difficult to determine accurately, and it should be very nearly correct.

The fuel burned on a 1 per cent grade for grade and train resistance is 23.3 gal., from which the train resistance equals 11.7 lb. per ton.

Locomotive Friction Is Large Item

This does not check with the assumed 7 lb. per ton, because the 7 lb. covers only rolling friction, and the 11.7 lb. is for rolling friction plus locomotive internal friction, such as pistons, valves and other engine parts. If Schmidt's 7 lb. is correct for the rolling friction, then the difference, 4.7, is the locomotive internal friction. For the given train of 1,000 tons this is equal to a drawbar pull of 4,700 lb., or about 9.0 per cent of the total drawbar pull on the maximum grade of 2.31 per cent from Flag No. 5 to Flag No. 6.

As the negative grade increases, the fuel consumption is reduced until the negative grade resistance is numerically equal to the total frictional resistance of train and engine. The minimum fuel consumption of 2.5 gal. per mile as shown on the curve represents standby losses and should be about equal to the fuel burned standing on a siding with the train. For heavy negative grades the fuel consumption is again increased, for pumping air for braking purposes.

The over-all efficiency determined by this test, 5.57 per cent, is the ratio of the integrated foot-pounds of work done by the engine whenever the drawbar pull was positive to the total energy in the fuel used over the same time. Apparently it is constant for all grades greater than 0.5 per cent.

While drifting saves fuel, it is seldom possible to drift to rest except on positive grades. Fig. 4 gives a measure of the saving that may be made. The kinetic energy in terms of fuel in a 1,000-ton train moving at 50 miles per hour equals 27.74 gal. If the engineer makes a sudden stop by heavy braking the greater part of this is lost in heat at the brake shoes. If his train schedule will permit him to drift down to 25 m.p.h. before applying brakes the fuel equivalent for kinetic energy is 6.93 gal., and 20.81 gal. of fuel will be saved. Drifting to one-half normal running speed before applying brakes saves 75 per cent of the fuel equivalent for kinetic energy. The fuel burned in actual train movements depends upon the efficiency of the locomotive and the skill of the engineer, while that burned for miscellaneous purposes depends upon traffic conditions and the general efficiency of the division organization in handling traffic. In this discussion the ratio between the fuel burned moving the train and the total fuel charged to road service is called "operating efficiency, fuel." Such a ratio is a measure of the operating efficiency of the division organization. The high value determined by this test, 92.5 per cent, indicates a co-operation between dispatchers and train crews not often realized. It indicates also a very small margin of possible gain

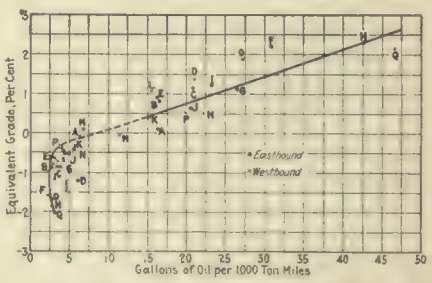


Fig. 3—Unit Fuel Consumption on Various Grades

between steam locomotives, well handled, and the theoretical limit of the electric locomotive, 100 per cent less engine auxiliaries.

Though the locomotive used for this test is one of the well known types for heavy mountain service, and was tested under its most economical load, yet the average thermal efficiency is less than 6 per cent; hence a slight numerical increase in this efficiency would result in a tremendous saving in fuel. The superpower survey showed an expected fuel saving of 67 per cent in freight service, which means a thermal efficiency of about 8.5 per cent. In making such comparisons it is necessary

TABLE I—GRADE AND CURVATURE—TEHACHAPI EASTBOUND

Points in Fig. 3	Location From	Location To	Distance, Miles	Rise, Feet	Total Curvature, Degrees
A	Kern Jct.	Magunden	3.4	17.8	.....
B	Magunden	Edison	3.1	135.7	.....
C	Edison	Flag 1	5.6	342.9	17.5
D	Flag 1	Flag 2	1.0	—68.9	99.3
E	Flag 2	Flag 3	6.2	268.9	589.5
F	Flag 3	Flag 4	0.9	89.0	376.3
G	Flag 4	Flag 5	2.2	115.0	417.5
H	Flag 5	Flag 6	23.4	2,575.0	6,751.0
I	Flag 6	Tehachapi	1.2	79.5	17.6
J	Tehachapi	Summit	1.8	58.5	.....
K	Summit	Flag 7	2.1	—46.0	.....
L	Flag 7	Flag 8	1.1	—65.0	13.6
M	Flag 8	Proctor	1.5	5.5	46.4
N	Proctor	Flag 9	1.5	—39.5	.....
O	Flag 9	Flag 10	0.9	—80.0	98.3
P	Flag 10	Flag 11	1.9	—50.0	27.9
Q	Flag 11	Flag 12	8.6	—960.0	547.7
	Total distance		67.8		

to take account of the ratio, revenue freight weight to total train weight. In this study it was 0.743. In electric service it may be very different. The efficiency determined during this test is lower than many published values, but, as a rule, such tests are made with picked locomotives, especially adjusted and operated by the best crews.

It is not desired to give the impression that the values of factors given as the result of this investigation are absolute and applicable to all conditions. It is believed that this method of testing attacks the problem from an entirely different angle, from which it is possible to make, of certain factors, analysis in detail that has not been possible by other methods.

Discussion

Dr. Cary T. Hutchinson, in a written discussion, stated that the paper is the most noteworthy yet published on the subject, and that probably no one ever has attempted fuel determinations of similar accuracy. It is, however, not general in scope, being limited to conditions of service on this particular section of the Southern Pacific. No drawbar pull measurements were made, hence figures for efficiency are based on calculations of work done from the profile, under the author's assumptions.

Using the data presented, Dr. Hutchinson says he is led to certain results at variance with the author's. By a mathematical analysis it is shown that the straight part of the curve in Fig. 3 should be concave toward the axis of abscissas. From another series of equations it is deduced that for 53 lb. per ton resistance, the maximum value found in the tests, the oil burned was 0.4 gal. and the efficiency 5.93 per cent. The author's maximum thermal efficiency of 6.41 per cent is declared to be erroneous. The actual maximum thermal efficiency, as based on the author's curves, is thus 0.5 per cent less than the figure he gives. Referred to the drawbar the efficiency is reduced still further to 4.45 per cent.

The author says the over-all efficiency determined by this test was 5.57 per cent, and apparently was constant for all grades greater than 0.5 per cent. The derivation of this figure is not given, but it may be taken to represent the average thermal efficiency when the engine is doing work, based on the oil used during those periods, and eliminating all oil used at terminals or when the tractive force is negative. This efficiency is referred to the rim of the driver and not the drawbar. Using the given values, the following is found:

	Eastbound	Westbound	Both
Total oil, for positive tractive force	1,550	547	2,097
Total oil, stand-by and negative tractive force	291	409	700
Total oil for the run	1,841	956	2,797

The thermal efficiency, based on total oil used referred to the drivers, is 4.17 per cent. But the only "efficiency" that is significant in comparison with any other form of motive power is that referred to the drawbar. From the data given, the weight with the tender about two-thirds loaded is 250 tons for engine and tender, with 750 tons trailing. The average efficiency at the drawbar is then 3.12 per cent, while the maximum, likewise referred to the drawbar, is 4.45 per cent. In a word, assuming the author's fundamental result, "5.57 per cent over-all efficiency," the correct statement is an over-all thermal efficiency at the drawbar of 3.12 per cent, with a maximum of 4.45 per cent.

Several minor errors in the paper are pointed out.

Dr. Hutchinson states that the electric drive to replace this steam service would be a four-axle, 110-ton electric locomotive for 750 tons trailing weight; at 15 m.p.h. on the limiting grade the input would be less than 2,000 kw. Taking the efficiency from power house to drivers at 63 per cent (the author assumes 70 per cent in an earlier paper), the ratio of power at drawbar to that at power house will be 0.55. This section is ideal for regeneration. Under such conditions the comparative figures for energy used are given in the following tables:

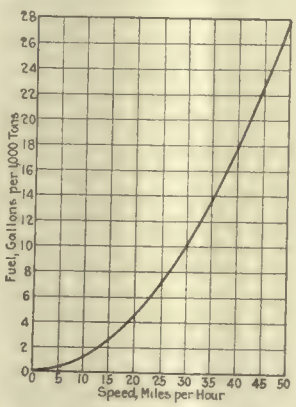


Fig. 4—Fuel Required to Accelerate 1,000 Tons

TABLE II—WORK DONE AT DRIVERS, STEAM DRIVE

	Eastbound	Westbound
Weight of train, tons	1,000	1,000
Work at drivers, kw.-hr.:		
(a) Grade	2,760	985
(b) Curve	250	25
(c) Track	690	240
Total	3,700	1,250
Available for regeneration (a)—(b+c)	1,820	720
Deliverable to contact system (75 per cent)	1,365	540
Deliverable at driver (80 per cent)	1,090	430
At driver as per cent of total work	29.4 per cent	34.4 per cent
Same, for round trip, same tonnage both ways	30.6 per cent	

TABLE III—RELATIVE HEAT REQUIREMENTS STEAM AND ELECTRIC FOR SAME SERVICE

	Steam	Electric
Weight of train, tons	1,000	860
Energy at driver, total kw.-hr.	4,950	4,250
Energy at driver, from oil, kw.-hr.	4,950	2,970
Energy at driver, from oil, per cent	100	60
Heat required at drawbar per kw.-hr., B.t.u.	109,000	45,500
Total heat required, 10.6 B.t.u.	540	135
Total heat required, per cent	100	25

This means that in comparison with the author's test result, electric drive would reduce the fuel required by 75 per cent, a ratio of steam to electric of four. If allowance be made for the difference between test and service conditions this ratio will be even greater. These results are in practical agreement with the estimates of the superpower report.

N. W. Storer commended the completeness of the test made, but said that 7 lb. per ton was too high a train resistance for a whole run, so the work calculated was more than would be the case. He also questioned the accuracy of the determination of locomotive resistance.

W. J. Davis pointed out that the results were better than could be expected from a coal-fired locomotive, stating that the cinder loss varied from 10 per cent to 18 per cent in coal-fired locomotives with the rate of coal burning varying from 100 lb. per square foot per hour to 125 lb. per square foot per hour.

Mr. Davis's principal point was that even though there were fuel savings, the fixed charges of electrification might easily offset them, but that the chief reason for electrification still existed in the advantages in conducting transportation. He cited increased capacity of tracks, reduction of overtime, very great savings in locomotives, repairs per locomotive and reduction of number of locomotives, because the average steam locomotive was available for service only 25 per cent of the time, whereas the average electric was available 95 per cent. Mr. Davis concluded that because of greater serviceability and because electrics could be made larger, one electric might actually replace four to five steam locomotives. Thus, said Mr. Davis, even with the fuel saving counterbalanced by fixed charges the saving in maintenance of locomotives, in maintenance of ways and structures, and the saving in wages, total transportation economies of 25 to 50 per cent might be realized.

Mr. Twogood, in replying for Mr. Babcock, said that they had tried all sorts of mathematical analyses, especially for the derivation of the curve of Fig. 3, and while that was an average curve drawn through the points, they could come to no other conclusion than the one given. He admitted that fuel was not the determining factor. He pointed out that operating officials were interested in the weight of the locomotive as well as of the train because eventually it was net revenue freight which paid the bill.

C. E. T. A. to Meet in Detroit

THE Central Electric Traffic Association will meet at the Wolverine Hotel, Detroit, Mich., on Wednesday and Thursday, May 16 and 17. The first session will be called at 10 a.m., Eastern standard time, and will be in the nature of a round-table discussion. Committee reports and other business will occupy the remaining sessions.

American Welding Society Annual Meeting

A Four-Day Meeting Was Filled with Many Reports of Committees Which Indicated that the Art of Welding Is Progressing Rapidly

THE annual meeting of the American Welding Society was held in the Engineering Societies Building, New York, N. Y., April 24 to 27. Reports of committees showed that much valuable work has been done by the society during the past year. At the business session on Wednesday morning a review was presented of the progress made during the past year in electric arc, gas, thermit and resistance welding. W. L. Warner, assistant to the chairman of the electric arc welding committee, covered the recent developments in the arc-welding field. He outlined the results accomplished in the direction of standardizing tests for welds, referring to the differences in details of procedure which have caused such widely divergent results. A set of standards submitted by the committee marks the starting point of standardization in this line.

An important work accomplished was that in connection with welding-wire specifications, on which a report was published last December. It included specifications for iron and steel bare electrodes and iron and steel gas welding rods. Recommended standards for coated or covered electrodes and gas welding rods for welding high-carbon steel and non-ferrous metals were also included.

Another work of standardization accomplished was in connection with standard definitions. A list of these, together with a classification of apparatus and an outline of the information required to be furnished by both the supplier and purchaser of arc-welding apparatus, was included in a report of this committee.

A report on welded rail joints showed that welding is being used extensively by electric railways for rail joints and that trouble has been experienced in all types through breakage. In order to secure information of various processes, a questionnaire was sent out by the committee, and a critical summary of these replies was compiled. The A.E.R.A. standard girder rail is being welded generally but the prevailing opinion seemed to be that a T-section is welded more readily than a girder section.

Practical data were given for joint plates, filler rods, electrodes, fluxes, protective accessories, methods of preparation of weld and preheating. The general opinion was that joint plates should be of low-carbon steel, possessing a fair ductility, and that the filling material should be of the same nature.

The high points of development in the oxyacetylene processes of welding were given by G. O. Carter, consulting engineer Linde Air Products Company. The welding of pipes in long stretches was considered as the outstanding feature of last year's work in this field. A considerable extension of oxyacetylene welding to maintenance and repair work has resulted during the past year. Engineering investigations have been conducted to determine causes of failure, and recommendations of improved practices for handling similar problems in the future have resulted. Oxyacetylene cutting is being used more extensively than ever.

Developments in thermit welding were outlined by J. H. Deppeler, chairman of the research committee on thermit welding. Mr. Deppeler said that the particular advances were in connection with more economical use of thermit. Considerable study has been given to the construction of molds so as to reduce the quantity of material necessary, and also to provide a construction which will permit the "washing" of the welded joints by the thermit metal so as to require less material. Improvements in the construction of molds for welded rail joints have been described in previous issues of the ELECTRIC RAILWAY JOURNAL.

A report on resistance welding was given by Hermann Lemp, chairman of the resistance welding committee. Special effort has been devoted during the past year to the technical problems and to the processes which will undoubtedly aid in extension of the work.

Two inspection trips were arranged for the members attending the convention. Wednesday afternoon was spent at the shops of the Third Avenue Railway and Friday afternoon at the plant of the Oxweld Company in Newark, N. J. A large delegation witnessed numerous electric railway welding operations in the shops of the Third Avenue Railway. This included welding truck side frames, motor cases and broken truck parts, together with the building up of bearing fits and other wearing parts. The second annual dinner of the society was held at the Park Avenue Hotel on Wednesday evening.

The program of the technical session held on Thursday evening included a paper by Prof. H. L. Whittemore, chairman of the pressure-vessel welding committee, on the work done by this committee during the year. A review showing what the course of training of welding operators will include was given by J. C. Wright, director of the Federal Board of Vocational Education. It is expected that this course will prove the best so far prepared and its adoption is predicted for all the training schools in welding.

The new officers elected for the society were T. F. Barton, president; A. V. Thompson, vice-president of the Pacific Coast division; C. L. Jones, vice-president of the Southern division, and the following directors at large for a term of three years: C. A. Adams, H. S. Smith, A. M. Candy and C. J. Holslag.

A.S.T.M. Issues Provisional Program

As usual, the annual convention of the American Society for Testing Materials will be held at Atlantic City. The headquarters will be the Chalfonte-Haddon Hall, and the dates Monday, June 25, to Friday, June 29. A synopsis of the tentative program follows:

MONDAY
Morning and afternoon, committee meetings.
Evening, non-ferrous metals and alloys.

TUESDAY
Morning, corrosion, fatigue of metals and magnetic analysis.
Afternoon, wrought and cast iron, coal and coke, and heat treatment.
Evening, presidential address, informal dance and smoker.

WEDNESDAY
Morning, steels and methods of testing—reports of administrative committees.
Afternoon, committee meetings.
Evening, symposium on consistency—testing of glue.

THURSDAY
Morning, road materials, waterproofing and thermometers.
Afternoon, timber, rubber and textiles.
Evening, preservative coatings, cement, lime, gypsum and nomenclature.

FRIDAY
Morning, petroleum products, electrical insulating materials, slate and concrete.
Afternoon, golf and tennis tournaments.
Evening, symposium on the properties of, and methods of making concrete which require further investigation.

Safety Promoted in Massachusetts

A VERY successful congress of the Massachusetts Safety Council was held in Boston this week. Edward Dana, general manager Boston Elevated Railway, presided. Elton S. Wilde, vice-president and general manager Union Street Railway, New Bedford, Mass., made an address on "Collisions as the Motormen See Them."

Canadians Will Meet in Toronto

JUNE 27 to 30 will be the period of the 1923 convention of the Canadian Electric Railway Association, which will be held in Toronto. Headquarters will be at the King Edward Hotel and Charles L. Wilson, Toronto & York Radial Railway, is chairman of the convention committee. Details of the program will be announced shortly.

New Yorkers to Meet at Bluff Point

THE forty-first annual meeting of the New York Electric Railway Association will be held on Saturday, June 23, at the Hotel Champlain, Bluff Point, Lake Champlain, N. Y. The program will be announced later.

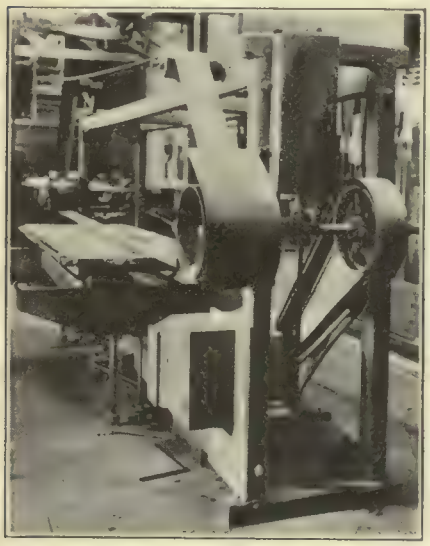
Educational Meeting at Providence

THE New England Street Railway Club will meet with the local section of the A.E.R.A. at the Biltmore Hotel, Providence, R. I., on May 10. Dinner will be served at 6:30 and the program will follow. Prof. W. H. Timbie, Massachusetts Institute of Technology, will speak on the educational work for employees of the Boston Elevated Railway.

Maintenance of Equipment

Home-Made Sander

THE accompanying illustration shows a home-made sander which has been constructed in the shops of the Lehigh Valley Transit Company, Allentown, Pa. The sanding belt is driven by a small motor. The motor is located on a framework near the floor and has a housing to protect it from the dust of the shop. The driving shaft has two 12-in. pulleys, one of which is used by the belt from the motor and the other for driving the sanding belt. The pulleys have sheet-iron guards for the safety of employees.



Home-Made Machine in the Shop of the Lehigh Valley Transit Company

The sanding belt passes from the driving pulley around a similar pulley at the opposite end of the table, then up to a smaller diameter pulley mounted on a lever with a spring attachment to keep the sanding belt tight. A similar small stationary pulley is used at the opposite end above the driving pulley. The pulleys and necessary shaftings are mounted on a substantial wooden framework.

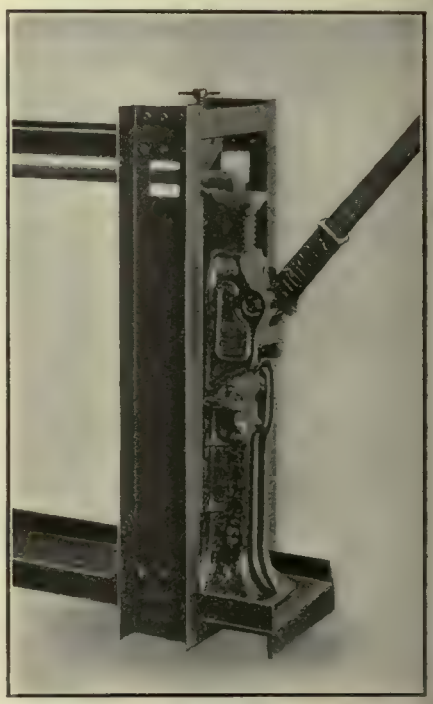
The table of the sander is made of 2-in. x 2-in. strips held in place by sheet-iron bands. The front edge of the table is provided with a long handle for moving the table back and forth as the sanding operation progresses. The table is mounted on rollers which operate on a track supported by sheet-iron plates at either end of the table. These tracks are bent upward at the ends to provide stops, so that the table cannot be pulled off the track.

The height of the table is adjusted by moving the sheet-iron plates which support the track up or down as desired. The vertical shafts attached to the plates have screw threads, and beveled gears cause these to rotate so as to raise or lower the table. The two screws at the end are connected through beveled gears at the center, so that they work in unison by turning a hand wheel at the center underneath the table.

Testing the Lifting Power of Jacks

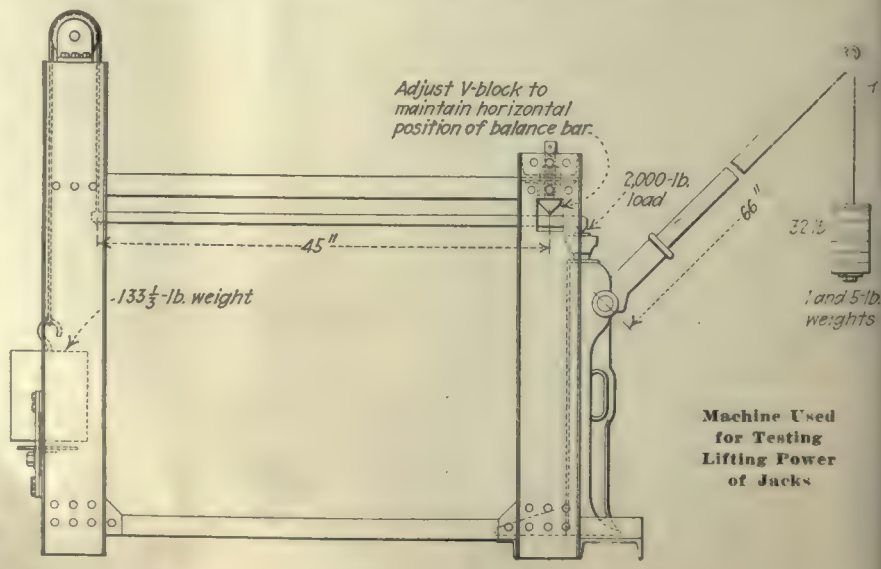
FOR the purpose of testing the lifting power of Simplex jacks, which they manufacture, Templeton, Kenly & Company, Ltd., Chicago, Ill., have devised and used the machine shown in the accompanying illustrations. This machine measures accurately the force which must be applied to the jack lever to lift any given load, that is, it shows the "man power" of the jack. The drawing shows the set up for testing a jack under 1 ton load. The jack shown has a capacity of 15 tons.

The apparatus consists simply of a lever, of which the fulcrum is a hardened knife edge placed 45 in. from one end and 3 in. from a second knife edge at the other end. This is mounted in a substantial frame. Force applied upward by the jack at the right-hand end in the drawing is resisted by the pull on a cord passing over a pulley and carrying a weight which, in this case, is 3/45 or 1/15 of a ton.



Close-Up View of Jack in Position for Testing

For convenience in testing, a lever 66 in. long is used, and the test is made with the lever in the starting position, as in this position the max-



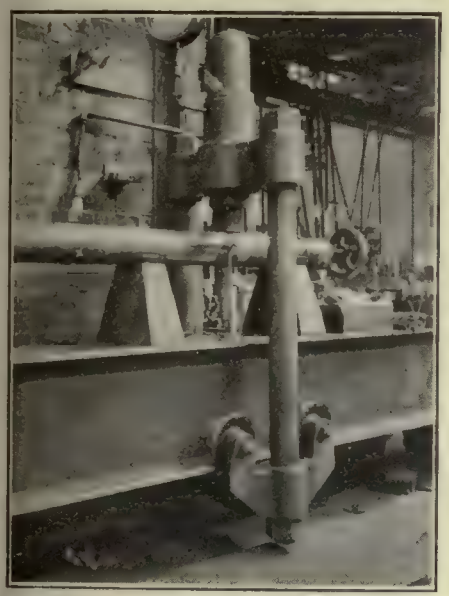
Machine Used for Testing Lifting Power of Jacks

imum effort is required and the number of men required for the stroke is determined.

In the No. 29 jack, which is largely used by electric railways, the pawl center is ⅜ in. distant from the fulcrum center. When a lining bar weighing 25 lb. and having a length of 66 in. is used as the operating lever, 32 lb. force is required to lift 1 ton.

Testing Axles for Flaws by Hydraulic Pressure

GREAT care in the testing of axles is exercised by the United Electric Railways, Providence, R. I. For this purpose the Watson-Stillman hydraulic straightening press shown in the accompanying illustration is used. The axle is carried on the machine by means of centers



Hydraulic Axle-Straightening Machine Used for Testing Axles for Flaws

mounted as in the tailstock of a lathe. Hydraulic pressure is applied to the axle from point to point, by means of a plunger forced against its upper side by pressure in a cylinder cast in a yoke, this forming the upper part of a traveling carriage. This carriage is moved from point to point by means of flanged wheels which roll on the lower flange, of heavy I-beams forming the bed of the testing machine.

During a test the axle is supported on two pillow blocks, one about 2 ft. on each side of the point of application of the force. The axles are cleaned of all surplus oil and dirt. When pressure is applied oil will show on the axle where there are any cracks. Inspection is made at all shoulder reductions and keyways.

Good Motor Record Through Hard Winter

NOTWITHSTANDING the fact that an unusual quantity of snow fell in Binghamton during the past winter, amounting to about 60.7 in. altogether, the railway had comparatively few motor failures. The total car-miles operated during the winter months was 565,993 and the total number of motor failures was twenty, or approximately 3.53 per 100,000 car-miles. In this respect the modern ventilated motors made a better record than the older type non-ventilated motors, there being 2.32 failures per 100,000 car-miles with the former and 7.1 with the latter.

The ventilated motors in service on the Binghamton Railway are of two types: Thirty-two Westinghouse 506-A are used on sixteen single-truck two-motor cars weighing 20,000 lb. Six armatures were grounded due to overexertion in snow, and four fields were grounded, one being an interpole field and three being main field coils grounded by water. Sixty-eight Westinghouse 323-V motors are used for twenty two-motor cars equipped with maximum traction trucks and weighing 32,500 lb. and for seven four-motor cars weighing 36,700 lb. With the 323-V motors three armatures were grounded due to exertion in snow and five fields were grounded, four being interpole and one main field coil.

The total number of non-ventilated motors in operation is seventy, of which thirty-two are GE-80, sixteen GE-67 and twenty-two GE-1,000. All the General Electric motors have the top and bottom motor covers off the year around. The GE-1,000 motors are on two-motor single-truck cars weighing 20,000 lb. and used only as trippers. There were no failures of this type motor during the past winter. The GE-67 motors are used on single-truck cars weighing 26,000 lb. and on some two-motor double-truck cars weighing 35,000 lb. Two armatures grounded on account of exertion in snow were the only failures with this type motor.

All of the GE-80 motors are used on double-truck cars, some being 32,000-lb. cars equipped with maximum traction trucks and the remainder being 35,000-lb. cars with Brill 27-G trucks. These motors had during the winter four grounded armatures and four field coils grounded on account of water. The fact that the non-ventilated motors are all of older design than the ventilated motors accounts to a considerable extent for the relatively greater number of failures of the former.

A factor that has made it particularly important to prevent motor failures is the very small number of spare cars available. The Binghamton Railway ordinarily has 95 per cent of its rolling stock on the road in the afternoon rush hours. In order to do this an unusually large supply of spare parts is kept on hand, and whenever inspection shows a part to be worn, it is replaced rather than risk a failure by attempting to get additional service.

Milling Machine for Boring Compressor Cylinders

THE United Electric Railways, Providence, R. I., had in its shops a milling machine that was not working at 100 per cent output. The best routine job for it seemed to be the boring out of compressor cylinders, and the machine is now continuously at work on this job. The accompanying picture shows the cylinder casting of a compressor bolted to a cast-iron platen suitably drilled to receive the different types of compressor cylinders. The platen, in turn, is bolted to the table of the



Compressor Casting on Carriage of Milling Machine Ready for Reboring of Cylinders

milling machine, while the latter does the duty of a boring mill.

While undoubtedly in many cases it would be profitable to purchase a two-spindle boring mill for this job, in this case the milling machine was available and it turns out a fine piece of work.

Simple Combined Screen and Sand Drier

THE accompanying illustration shows the plan used in the carhouse of the Eastern Massachusetts Street Railway at Fall River for screening and drying sand.

The drier consists of a stove surrounded by a conical hopper. Below the hopper is a conical spreader or deflector on which the sand flows out as it dries. This addition was



Combined Screen and Sand Drier Used at Fall River

placed at the bottom to spread sand and to prevent it from going through before thoroughly drying.

Above the drier is a motor-driven, cylindrical screen covered by a piece of sheet iron to guide the sand from going anywhere but into the screen. The bottom part is shaped so that it guides the sand into the drier. The stones or any foreign material other than the fine, screened sand roll toward the rear of the screen into a pipe and are carried through the wall to the outside of the building.

Soft coal is used for heating purposes. The motor is one taken from an air compressor removed from an obsolete car. As workmen or the watchman pass through the sand room in the course of their work they throw a few shovelfuls of sand into the screen and in that way assure an ample supply.

Maintaining Electrolytic Lightning Arresters

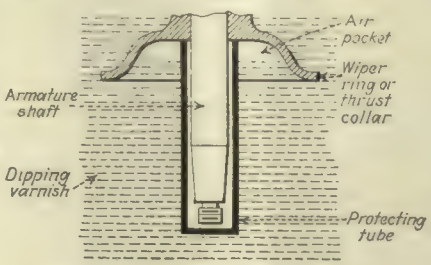
THE Lehigh Valley Transit Company, Allentown, Pa., was one of the first electric railways to use the electrolytic type of lightning arrester and has been obtaining very satisfactory results. All arresters are installed inside the cars so that it is unnecessary to remove them during the winter months. In most cases space has been found for the arresters in the headlining or sides of the vestibule platform. In a few cases where there was not room for these on the platform they have been installed inside the passenger portion of the car body by providing a wooden box for holding the arresters. This box is painted and varnished to correspond to adjacent woodwork. The wiring to the arresters is run in either conduit or in circular loom. Particular attention is given to make the lead from the trolley base to the arresters as short as possible.

In the spring, before the lightning season starts, all arresters are inspected and are filled up with solution. From that time on to the end of the season they are inspected each time the car is in for repairs or inspection.

Convenient Tackle Aids in Dipping Armatures

BY JOHN S. DEAN
Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company

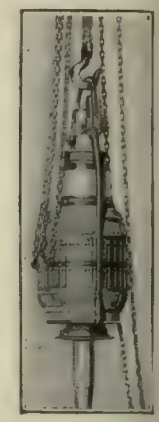
IN CONNECTION with the dipping and baking of armatures to increase the life of the windings, experience has shown that it is essential to dip them with the commutator end up. This keeps the varnish from getting inside of the commutator, where it is likely to cause trouble, as it is difficult to dry it out thoroughly during the baking process. One master mechanic has devised a very simple and effective clamping device for holding armatures in a vertical position, with the commutator end up, while dipping them, and which is also arranged to receive the hook from the chain hoist used in handling, as shown in one of the accompanying illustrations. The two



Tube Over Armature Shaft During Dipping Operation

swinging side arms of this clamp are bent over at the lower end to engage the pinion end coil support extension or the end bell. The top of each of these two arms is provided with a number of holes, making the clamp adjustable to take armatures of different sizes without danger to the winding or the commutator.

In connection with this operation, the question of keeping the varnish from the pinion end of the armature shaft has been given considerable thought. One method employing a tube over the shaft was described in the ELECTRIC RAILWAY JOURNAL for April 21, 1922, and a similar sleeve method is used by the same master mechanic who designed and built the above clamping device. After dipping several of his armatures he noted that the portion of the shaft inside of the wiper ring was never touched by the varnish. He reasoned that this was, no doubt, due to the air pocket formed by the wiper ring, so he conceived the idea of slipping a small tube, closed at the lower end, over this end of the shaft. This tube is slipped over the pinion end of the shaft just before the armature is dipped, which keeps this part of the shaft free from varnish. This saves the necessity of cleaning with benzine or naphtha or scraping the shaft after the dipping and baking process, and also keeps the varnish out of the threads of the shaft, thus reducing the expense of handling the armatures while giving them this treatment.



Adjustable Hooks Hold Armature in Vertical Position for Dipping

New Equipment Available

A Blueprint Drying Machine

THE C. F. Pease Company, Chicago, Ill., which manufactures automatic blueprinting machinery, has brought out a drier for blueprints and photographic prints. The wet prints are drawn around a heated cylinder by means of an endless canvas belt and delivered into a receiving tray. The delivery speed of the machine is stated to be up to 8 or 9 ft. per minute. A thermostatic control is provided where the cylinder is heated with gas, whereas for an electrically heated cylinder there is an arrangement of switches by means of which the temperature can be readily controlled.

The News of the Industry

Virginian Railway to Electrify

$15,000,000 Contract Placed with Westinghouse Company Covers Locomotives and Power Supply for 213 Miles of Track—Single Phase System Adopted

THE Virginian Railway has announced its decision to electrify 213 miles of track between Roanoke, Va., and Mullens, W. Va., at a cost of $15,000,000. The division to be electrified crosses the Allegheny Mountains. The a.c. single-phase system will be used. The order for the electric locomotives, power house, transformer stations, and other apparatus has been awarded to the Westinghouse Electric & Manufacturing Company and is said to form the largest railroad electrification contract ever placed.

"The Virginian Railway, one of the newest systems, is a leader in heavy operation, and this undertaking will be epochal in the history of American railroads," said Frank H. Shepard, director of heavy traction for the Westinghouse Company. "Built by the late Henry H. Rogers, of the Standard Oil Company, in accordance with the most modern engineering practice, it has been renowned for the excellence of its construction, the immense size of its trains and its low ton-mile costs ever since it started operations in 1909. The Virginian, as a matter of consistent policy, has regularly increased the size of the trains with every improvement in railroad equipment, until today this railroad is operating the heaviest trains in the world and hauling them by the most powerful of steam locomotives. It is now moving 7,000,000 tons of coal per annum, but this capacity is not enough. Still further increasing the size of the trains is impossible with steam, for the limit in the motive power appears to have been reached. Hence it has been decided to electrify with the alternating-current system this limiting mountain grade division.

"The chief advantage of electric operation is the greater power that can be applied to each train. The largest steam locomotives now in use on the Virginian are the articulated Mallet type, three of which are used to move 5,500-ton trains over the grades. Their combined power does not exceed 7,000 hp., and their speed on the grades is only 7 m.p.h. The new electric locomotives, however, developing 20,000 hp. per train will haul 9,000-ton trains up the grades at the rate of 14 m.p.h., and it will be entirely practicable to increase this power so that 12,000-ton trains can be handled at the same speed.

"This electrification is one of the largest railroad projects since the world war. It is undoubtedly the forerunner of other similar undertakings, because it is generally recognized that the traffic-carrying capacity of a number of our leading railroads must be increased.

"A feature will be the use of regenerative braking on the down grades, which will not only reduce wear on the brakeshoes and wheels and improve operation, but will save 15,000,000 kw.-hr. of electric energy per year.

"Power will be obtained by a 90,000-hp. generating plant to be erected on the New River, supplying 88,000-volt current to the transmission line. This is to be stepped down to 11,000 volts by transformer stations placed along the line."

Ottawa Board of Conciliation Formed

The employees of the Ottawa Electric Railway, who are members of the Amalgamated Association, on April 16 applied to the Minister of Labor for a board of conciliation under the industrial disputes investigation act. A board has been formed. George D. Kelley of the firm of Ewart, Scott, McLaren & Kelley, Ottawa, has been appointed for the company, and Harold J. Burns, barrister, Ottawa, for the employees. The demands of the employees are that all employees shall belong to the union; that the eight-hour day be established in all departments of the company's business, and that hourly rates of wages be increased by 25 per cent. The board will probably begin its sittings shortly.

Detroit Officials Opposed to Wage Increase

At a meeting on April 28 of platform men of the Detroit Department of Street Railways, members of Local No. 27, a letter from the street railway commissioners to the officers of the union was read which explained the attitude of the municipal officials in regard to the 20 per cent increase in wages asked by the men.

The communication advised the men that their request for a wage increase was untimely and could be discussed more properly after May 15, on which date the Department of Street Railways will have completed one full year of operation. It is explained that a study of a report for the year will enable the members of the commission to go more thoroughly into the request of the platform men and study the conditions.

The request, which was practically refused by the commission, will be taken up with Mayor Doremus at some future date by a committee of the local organization's officers appointed by the men at the meeting. The date of the proposed conference with the Mayor has not been decided. The men have decided to ask Judge E. J. Jeffries to represent them in case the petition for the increase in pay is submitted to arbitration.

Wages of Pacific Electric Trainmen Raised 3 to 6 Cents an Hour

An increase in wages of trainmen of the Pacific Electric Railway, Los Angeles, Calif., approximating $350,000 annually and effective April 16, 1923, was announced on April 12 by D. W. Pontius, vice-president and general manager. The change will have the effect of increasing the present scale 3 to 6 cents an hour, according to the class of train service. In making this announcement, Mr. Pontius states that the new rates are partly a restoration of the rates in effect prior to Oct. 1, 1921, at which time a reduction was made in the wages because of economic conditions.

Mr. Pontius stated that the work in the train service was more trying and confining than in any other branch of railway service, as the hours, in a great many instances, were irregular and that the increase was made with the view of keeping in the company's employ a good class of men.

At the time of the wage reduction in 1921 other departments of the company were not affected. This increase in trainmen's wages will not affect other departments of the company.

Following is the schedule of the new rates in cents per hour:

Street Car Service	Hourly
First three months	49
Next nine months	50
Second year	51½
Third year	52½
Fourth year and thereafter	53½
Double-Track Interurban	
First year	52½
Second year	55
Third year	56
Fourth year and thereafter	57
Single-Track Interurban	
First year	55
Second year	57½
Third year	58½
Fourth year and thereafter	59½
Freight and Work Train Service	
Motormen and conductors (flat rate)	66
Brakemen and switchmen (flat rate)	60
Trolleymen (flat rate)	55
Yard foreman (flat rate)	66

Minimum rate for new men entering the service $125 per month.

Commissioner Convinced Railway in Birmingham Is Right

The Birmingham Railway, Light & Power Company, Birmingham, Ala., is nearing a settlement of all its disagreements of the past over street paving, fares and the Jim Crow law recently adopted by the City Commissioners. According to D. E. McLendon, chairman of the city commission, the differences may be settled within a few days.

It is believed that the company will agree to reduce its fares from 8 to 7 cents, to pave certain streets which have been in dispute, and to partition all cars, thus separating the whites from the negro passengers.

It is also possible that the jitneys will go. In speaking of the jitney Mr. McLendon said:

> If Birmingham's growth is not to be retarded, it is time that we take the jitneys off the streets. In justice to the Birmingham Railway, Light & Power Company the present situation must be remedied quickly. It is time and more than time to take a definite stand. The stand I take is that the jitney must go. Birmingham has given the jitney a fair trial, and I cannot see where it has been of any advantage. Of course, there are individual and group instances where the jitney has been a convenience, but that does not offset the great cost it entails in direct financial loss to the city, and in keeping our biggest public service institution in bankruptcy.

Commissioner McLendon was referring to the railway, which has been in the hands of a receiver for some time, and according to him the jitney is largely responsible for this condition of the company.

Mr. McLendon declared:

> In direct cash revenue the city is losing $12,000 a year because of the curtailment of income to the city from the company. The company is sustaining a dead loss of $60,000 every year. The jitneys are the cause of this loss.

In speaking of the paving matter, over which the company and the city have been squabbling for some time, Mr. McLendon said:

> It is not fair for the company to have to pay many thousands of dollars for the maintenance of streets used by the jitneys. Immediate steps should be taken to relieve the present intolerable situation. Every visitor coming to Birmingham, every prospective factory, is at once made aware that our most obvious public utility is in the hands of a receiver. That cannot but react to the city's discredit.
>
> We should take into consideration the great sums of money the company has paid out for permanent improvements in Birmingham. It has paid much for street surfacing in practically every section of the city and its only return on the investment is community improvements which make more passengers. I don't think it just for the jitneys to step in without paying one cent toward these improvements and reap the rewards. It is time to enact laws that will take the jitneys off the streets and forever prevent them coming back.

Wage Agreements in New York Being Effected

Fears of a strike among trolley workers in Syracuse, N. Y., are rapidly being dispelled as new agreements are being approved by the workers. One of the matters that remain to be adjusted, however, is the new scale for New York State Railways men. The men on these lines have ratified a demand for a 30-cent increase.

The Empire State Railroad Company, operating lines from Syracuse to Baldwinsville, Fulton and Oswego, has renewed an agreement with its men on practically the same terms as last year with the rate remaining at 53 cents. Some of the working conditions have been slightly changed.

This agreement is fundamentally the same as that just executed between the Rochester & Syracuse Railroad and its employees. Only one interurban wage problem is unsettled and that is between the men and the Syracuse Northern. These employees are asking an increase to 53 cents from 48 cents an hour.

The Auburn & Syracuse has settled its differences with its men. The new rates for city men will be 49 cents an hour and 50 cents for interurban employees. Freight and express employees are to get 52 cents.

Pittsburgh Wage Matter Remains Deadlocked

The matter of wages and working conditions for employees of the Pittsburgh Railways has been hanging fire now for several weeks and up to May 3 the deadlock remained unbroken. As was reported in the ELECTRIC RAILWAY JOURNAL, issue of April 14, the receivers of the property had requested the employees to modify their demands on the ground that the 10-cent cash fare now in effect would not be sufficient to meet the proposed 20 cents an hour increase in pay.

On May 2 the employees voted 2,177 against 9 to reject the offer of the receivers to increase the wages 10 per cent or 6 cents an hour. This would bring the maximum to 66 cents. The executive board of Division 85 representing the 3,000 motormen and conductors employed by the Pittsburgh Railways was still in session on May 3 and had reached no decision on the question of ceasing work.

The receivers on May 2 reiterated their proposal to place the entire question of working conditions and a wage increase before the Board of Arbitration, but this the international vice-president and the secretary of the local union refused to approve. Two problems are being passed on by the executive board.

They are: (1) How to avoid arbitrating the controversy which the receivers of the Pittsburgh Railways proposed on May 2 as an alternative to the rejection of the offer of a 10 per cent increase, and (2) how to win the receivers of the company over to restoring the 1920 and 1921 wage rate of 70 cents an hour.

The employees are asking a 33⅓ per cent increase or a maximum rate of 80 cents an hour, which is 10 cents an hour more than was received during the war. It is reported that the executive committee has authority to call a strike without further vote by the members of the union.

It is believed that if the receivers of the company will offer 70 cents, the peak wage paid during the war, the men will accept it.

Will Disclose Operation in Spartanburg Under Commission Management

The South Carolina Gas & Electric Company, Spartanburg, S. C., now operated by the South Carolina Railroad Commission, was scheduled to be the subject of a public hearing in Spartanburg on April 27, at which time the company was to submit statements as to its operating costs and earnings, with a view to letting the public know how it is getting on under the Railroad Commission management.

The Railroad Commission in announcing the hearing stated that it was considered at the request of the Spartanburg company. The Railroad Commission says, however, it does not know whether the company desires a discontinuance of the present plan of operation or desires some amendment to it. The petition for the hearing states that it is asked in the interest of the rights of the public.

The commission is asked to "issue such orders as in its judgment it deems expedient and necessary to protect the rights of the public and the interests of those who avail themselves of or are dependent upon the service of the company."

The Railroad Commission has instructed the railway company to submit at the hearing a complete financial statement and planned to hear any representative of the public.

Some months ago the Spartanburg company discontinued its cars, announcing that losses made the move necessary. The Railroad Commission ordered service resumed, on long schedules, and the commission has since been in charge of the situation. Recently regular schedules were ordered restored, and a 5-cent rate of fare was put into effect.

City and Railway in Toronto Appeal Arbitration Award

The Toronto Railway and the city of Toronto have appealed against the majority award of the arbitration board appointed to determine the value of the Toronto Railway Company's property taken over by the city on the expiration of the franchise on Aug. 31, 1921. The railway's notice of appeal asks that the city appeal be set aside, that the whole matter be sent back to the arbitration board with the instructions that it include in the amount the value of the main office building at King and Church Streets, the Scarboro Beach property and the St. Lawrence Street property and other items which the arbitrators rejected. The price to be paid by the city for the properties had been fixed by the board at $11,188,500. An abstract of the arbitration finding was published in the ELECTRIC RAILWAY JOURNAL for Feb. 10, page 247. It is stated that there is no dispute between the parties with regard to items making up about $7,000,000 out of the $11,188,500 awarded by the majority board.

Bus Franchise Defeated

McAdoo Interests Lose in Los Angeles —Railway Will Have Opportunity to Make Good

The so-called McAdoo - Hellman twenty-one year motor bus franchise was defeated on May 1 by Los Angeles voters by more than 12,000 votes. The proposition for repealing the present jitney bus ordinance was also defeated by more than 4,000 votes. As a result public motor carriers will continue to be banned in the down-town district.

The People's Motor Bus Company, conceding defeat, filed an application with the local Board of Public Utilities immediately after the election withdrawing all its propositions for motor bus lines in Los Angeles over some nineteen routes paralleling all railway lines and reaching practically every section of the city. The withdrawal, however, is given as temporary. The Hellman-McAdoo interests, back of the People's Company, state there is no necessity of their company entering the field again now, as railway companies have promised Los Angeles adequate bus lines and improved railway service to relieve the transportation congestion.

After the election the railway officials declared the promises made by them to the people of Los Angeles before the election would be fulfilled at once. Work will be started immediately on improvements to cost in excess of $6,000,000.

The failure of the voters to grant a twenty-one year irrevocable motor bus franchise and the decision not to repeal the present jitney ordinance are generally interpreted to mean that the voters were unwilling to cripple the Los Angeles railway lines.

Under the present laws of Los Angeles the Board of Public Utilities can grant motor bus permits for operation outside of the downtown district, but evidently Mr. McAdoo's company did not see fit to spend $1,000,000 for bus equipment and operate under thirty-day permits or even yearly permits.

Prior to the election the two railways filed a joint application with the Board of Public Utiilties for permission to install motor bus service in the Hollywood district on a 6-cent fare basis with interchangeable transfer. This application outlined that the two railways would be consolidated and promised an extension of the Los Angeles Railway lines into Hollywood and the establishment of universal transfers. The application stipulated a 6-cent fare between bus and Pacific Electric Railway cars and a 10-cent fare between Los Angeles Railway cars and buses within defined districts. The statement filed with the board practically admits that when the State Railroad Commission completes its survey of the local railway systems they will be consolidated as one system and that upon consolidation provision will be made for the extension of the Los Angeles Railway lines into Hollywood territory.

"Independents" are filing applications for revocable bus permits for operation in various sections of the city, but the substantial element of the city is demanding the Los Angeles Motor Bus Company, which was organized by the two railway companies, be given all permits for motor buses to be operated in co-ordination with the railway lines. The majority members on the local city Board of Public Utilities are inclined to give permits to the independents and the railways.

William G. McAdoo of the Peoples' Motor Bus Company made the following statement:

> My Eastern clients have withdrawn their application to establish a motor bus system in Los Angeles, and I think they have rendered a genuine service to the community in focusing the attention of the public on the city's imperative transportation problem. The railway monopoly under threat of competition has made various promises to meet the transportation necessities of the community. Those comprehend consolidation of the two street car lines, the building of subways, the extension of railway lines and the operation of motor buses. Everybody will await with interest performance in accordance with these promises.

Wage Advance in Cleveland

The wages of motormen and conductors of the Cleveland Railway were increased 5 cents an hour, starting May 1, as a result of arbitration between the Cleveland Railway and the street car men's union. The wage increase makes the new wage scale for the Cleveland trainmen—55 cents an hour for the first three months service, 58 cents an hour for the next nine months and 60 cents at the end of the first year.

The decision of the arbitrators was not unanimous, the men's representative, Judge Frederick Walther, dissenting from the award, which was concurred in by Judge Fielder Sanders, former City Street Railway Commissioner, and Thomas P. Schmidt, representing the company.

Following announcement of the 5-cent wage increase there was much dissatisfaction among the trainmen because they had asked for an advance of 15 cents an hour.

Meeting with the executive committee of the car men's union, John J. Stanley, president of the company, intimated that the company soon might have a proposal for establishing a pension system for employees who have long been in the service.

Oil City Men Get Increase

To show appreciation for the efficiency of its trainmen and also to attract the best type of man for service on its lines the Citizens Traction Company, Oil City, Pa., has voluntarily raised the wages of all motormen and conductors 5 cents an hour. The new scale is retroactive to April 16.

Under the present arrangement for the first six months of service men will receive 46 cents an hour; for the second six months, 48 cents, and for the third six months and thereafter, 50 cents an hour. One-man car operators will receive 5 cents an hour additional.

The old scale of 41, 43 and 45 cents became effective on June 1, 1921, and was a 10-cent reduction from the schedule which went into force on April 26, 1920.

Foreign News

Liverpool Plans $1,500,000 Overhaul Shop

It is proposed by the Liverpool Tramways Committee to erect a car overhauling depot capable of dealing with about twelve cars weekly, so that the whole stock of 650 cars may pass through the shops in a year. The estimated cost is £300,000.

In consequence of a further fall in the official index figure of the cost of living, the National Joint Council for the British tramway industry has, in accordance with the sliding scale agreement, announced that from the first full pay period in May a reduction will be made in tramway employees' wages of 1s. per week. This makes the total reduction since the maximum period of 15s. per week. The index figure is now 74 per cent over the figure for August, 1914.

The British Minister of Transport announces that he proposes to include the tramways (temporary increases of charges) act in the expiring laws continuance bill of the present session. This means that the operation of the act, which authorizes higher fares than the statutory maxima and which would expire this year, will be prolonged till December, 1924, The act was a temporary one passed to meet post-war conditions of high working expenses. The latter have now come down somewhat, but not sufficient to justify a return to pre-war fares. The index figure of the cost of living is still 74 per cent above the pre-war basis.

The rapid increase in the number of aerials for use in connection with the wireless broadcasting is giving some apprehension to British tramway authorities. In connection with post office wires the regulation is that when these cross above tramway overhead conductors efficient guard wires must be erected. The Council of Tramways & Light Railways Association has written to the Ministry of Transport on the question of what would be the position of a tramway undertaking in the event of accidents to third parties arising from a wireless aerial falling across the trolley wire and coming into contact with a person. The Council maintains that it is unreasonable that a tramway undertaking should be liable to put up guard wires in any case except where they arrived on the scene subsequently to the people against whose property the guard wires are required to give protection. The Council urges that a regulation should be framed so that those arriving on the scene with their wires subsequent to the construction of the tramway shall themselves be under the obligation to bear the cost of providing any necessary protection for the prevention of accidents. The Ministry of Transport is in communication with the Postmaster-General on the subject.

Financial and Corporate

$167,403 Increase in Net

Trustees of Eastern Massachusetts Street Railway Present Figures Covering 1922 Operations

The public trustees of the Eastern Massachusetts Street Railway, Boston, have presented the following report for the year ended Dec. 31, 1922:

EASTERN MASSACHUSETTS STREET RAILWAY EARNINGS

Combined financial statement of the seventeen operating districts included in the system.

	1922	1921
Passenger revenue	$9,989,729	$10,681,352
Freight and other revenue	56,464	36,899
Rentals, advertising, etc.	252,892	265,122
Interest; other income	413,578	334,891
Total revenue	$10,712,663	$11,318,294
Expenses:		
Way and structures	$1,879,506	$1,768,078
Equipment	1,250,715	1,518,279
Power	1,082,151	1,350,996
Car operation	2,345,373	2,658,888
Injuries and damages	356,701	362,312
Insurance	162,588	153,966
Law expense	13,546	9,912
Rent of tracks	77,258	79,017
General wages and expenses	247,121	263,910
Miscellaneous expenses	343,131	288,745
Operating expenses	$7,758,090	$8,454,103
Taxes	396,823	348,750
Gross income	2,557,749	2,515,410
Interest and rentals	1,497,956	1,623,021
Net income	$1,059,792	$892,389

Operating expenses include charges for depreciation amounting to $848,753.00 in 1922 and $992,847 in 1921.

$95,215 was added to the insurance fund in 1922. The corresponding charge in 1921 was $80,000.

Gross receipts from car fares in 1922 were $9,989,728, a decrease of $691,622, or about 6¼ per cent compared with 1921. Other items of revenue and income increased $86,021, so that the net decrease in total revenue was $605,601. On the other hand, operating expenses, including taxes, decreased $647,939 and there was, therefore, an increase in gross income of $42,338, notwithstanding the large loss in revenues. Fixed charges and rentals showed a decrease of $125,065. The final result was an increase in the net income for the year, compared with 1921, of $167,403. It was not until toward the end of 1922 that passenger revenues equaled those of the corresponding months of 1921. This improvement is traceable principally to better industrial conditions in several of the cities and towns served by this company, which have been in a state of depression since early in 1921.

The $1 punch-card reduced-rate ticket continues in effect in most of the cities and towns. It is interesting to note that it is being used almost exclusively except by transients and casual riders.

General operating expenses, excluding taxes, were $696,012 less than in 1921. The cost of operating cars was reduced more than $300,000. This was due to numerous economies and increased efficiency, and the use of one-man cars throughout the twelve months as against the general use of one-man cars only during the latter part of 1921.

The cost of maintenance of equipment was reduced $267,568 through better repair shop conditions and because the electrical equipment of cars suffered comparatively little damage during the mild winter of 1921-1922.

Power costs were decreased $268,845 chiefly as a result of cheaper coal during most of the year and the substitution of fuel oil for coal at the Quincy Point power station, which serves practically the entire system south of Boston.

The tax liability of the company for the year increased $48,000 and amounted to $396,823, or more than 36 per cent of the net income of the company after paying interest on its obligations.

During the year eight modern snow sweepers and other units were added to the snow-fighting equipment and the company now has in first-class working order thirty-seven sweepers, forty-five double-truck plows, forty-four single-truck plows and fifteen sets of scrapers. This comprises the most formidable snow-fighting equipment this company has ever had.

During the year there was no abatement of the work of rehabilitating the roadway, and in addition to the expenditures for maintenance of track, shown in the financial statement as "Way and Structures," $367,000 was expended for reconstruction.

Twenty-five double-truck cars of the latest type, suitable for one-man operation, were purchased during the year at a cost of $252,000. Orders for twenty-five and possibly a larger number of new double-truck cars will be placed in 1923.

EMPLOYEES' INSURANCE

The trustees have extended employees' insurance so as to include every person regularly employed by the company.

There has been a substantial reduction in the number of accidents, claims arising from them, and the cost of settlements. Collisions with vehicles, particularly automobiles, are still a serious problem.

For the first time in a number of years the wage agreement with the Amalgamated Association representing the union employees was entered into without arbitration. At the request of the various local unions the public trustees agreed to renew for another year the agreement expiring on May 1, 1922, which was founded upon an award by the State Board of Conciliation and Arbitration the previous year.

The financial readjustment plan announced early in the year met with very general response from all classes of security holders and is now more than 95 per cent complete. During the progress of this readjustment plan, $611,000 par value of common stock was distributed in lieu of accumulated dividends and has been charged to surplus.

In addition to the distribution made under the readjustment plan, dividends were declared during the year by the payment of 3 per cent on the first preferred and sinking fund stocks on Aug. 1 and by the appropriation of surplus accumulated to Dec. 31 to pay 3 per cent on these stocks as well as 6 per cent on preferred B stock on Feb. 1, 1923.

During the year funded obligations of the company to the amount of $463,000 were retired and canceled.

In May the company elected not to exercise its option to extend $479,000 Lowell, Lawrence & Haverhill bonds due on June 1, 1923, and provision has been made to pay them on that date.

Abandonment in Ohio Approved by Court

Following action of the Ohio State Supreme Court in Columbus on May 1 sustaining the order of the State Public Utilities Commission which authorized the Indiana, Columbus & Eastern Traction Company to abandon the branch between Columbus and Orient, F. A. Healy, secretary-treasurer of the company, announced at Springfield that the company would apply at once to Federal Judge J. E. Killitts at Toledo for an order of abandonment to carry out the commission's ruling.

The traction company filed a petition and secured the necessary consent of the commission to the abandonment of the branch some months ago, but residents attacked in court the right of the commission in the matter. The decision of the Supreme Court brings an end to the controversy and permits abandonment.

The Columbus-Orient branch is about 14 miles in length. Petition to abandon service was filed after the company had lost considerable revenue in late months due to automobile and bus competition.

Extends Time for Payment of Ohio Branch Line

Extension of fifteen days has been granted by Federal Judge J. E. Killitts at Toledo to C. D. Taylor, Norwalk, Ohio, for the final payment of $112,500 for the 40-mile Lima-Defiance branch of the Indiana, Columbus & Eastern Traction Company line. The original time limit for payment of the final sum was set for April 30, but counsel for Taylor appeared and asked extension saying that certain details of the financing remained to be cleared. Taylor had paid down $12,500 to bind the contract.

Application for purchase of the branch was made after the traction line had filed a petition and secured an order from the state to abandon the division, due to loss in revenue. Taylor proposes to operate gasoline cars over the branch to connect with the traction line, and has been selling stock in the enterprise to persons resident along the branch.

Eight Months Operation in Ashtabula Shows Increased Traffic

The municipally owned railway at Ashtabula, Ohio, for the eight months period ended April 1, showed receipts of $71,159 and operating expenses of $88,865. For a similar period the year previous, when the lines were owned by the Ashtabula Rapid Transit Company, the receipts were $55,675 and the operating expenses $60,305. Revenues from transportation for March of this year were $9,658, as against $6,430 in 1922.

Since the city took over the lines a considerable amount of track renewal and overhead work has been done.

Ten new safety cars, a bus and a 2½-ton truck have also been purchased by the lines at a cost of $73,792, covered by an issue of bonds. Total disbursements since the city took over the lines on Aug. 1 last have been $162,657. Since last August the municipally operated lines have carried 808,757 passengers as against 670,055 carried in the same eight months the year previous.

West Chester Street Railway Sold

Kelly, Cooke & Company, engineers, with offices at 424 Chestnut Street, Philadelphia, Pa., have acquired the controlling interest in the West Chester Street Railway.

The transfer was made on April 30, the majority stock holding having been purchased from the John W. Woodside estate, Philadelphia.

The new officers are as follows:

President, Charles B. Cooke, Jr., Philadelphia, Pa.; vice-president, Col. A. M. Holding, West Chester, Pa.; treasurer, Thomas L. Hodge, Philadelphia, Pa.; secretary, Jonas Rice, Philadelphia, Pa.

The officers and William F. Kelly, Philadelphia, Pa.; Marriott A. Good, Philadelphia, Pa., and J. V. Pennegar, Coatesville, Pa., comprise the board of directors.

The Philadelphia office of the railway will be discontinued and all business of the company transacted at its general office in West Chester, Pa.

Arkansas Central Power Co. Successor at Little Rock

The Little Rock Railway & Electric Company, Little Rock, Ark., has been succeeded in ownership and operation of the local traction and electric lines by the Arkansas Central Power Company, which filed articles of incorporation and agreement with the Secretary of State on April 10, 1923. The reorganization was carried out under the terms of the no-par-value act passed by the recent Legislature.

The operation of the company will continue under the old management, the following officers being re-elected:

D. H. Cantrell, president; A. Brizzolara, vice-president and treasurer; W. J. Tharp, secretary and auditor; C. J. Griffith, general manager; and H. U. Wallace, assistant general manager.

H. C. Abell, New York, was elected chairman of the board of directors of the company.

Allowed Return Being Earned in New Orleans

The Public Service, Inc., New Orleans, La., has reported for the first six months of the trial rates fixed under the agreement effected recently with the city of New Orleans. The statement shows that its earnings above all operating expenses were $1,953,125, or a little over 7.5 per cent, which was the rate of return agreed upon by the company and the city authorities.

The six months report shows the company has now on hand in cash $4,129,439, of which $1,701,369 is in ready cash and $2,428,069 in loans and notes receivable. There is also $1,339,899 in liquid assets, in addition to these cash assets.

The railway department is shown to have earned during the six months $748,819, the electric light and power department $721,416 and the gas company $482,889.

With the adoption of the changes recommended in the Beeler report it is expected that an annual saving of $853,717 will be effected, thereby guaranteeing a rate of return of 7.5, assuming that the succeeding six months will make as good a showing as has been made in the first six months of the trial rates.

Final Receivership Report of Fort Wayne Property Made

Robert M. Feustel, receiver for the Fort Wayne & Northern Indiana Traction Company, has filed his final report in the receivership action. It has been approved by Charles J. Ryan of the Superior Court. The report shows that Mr. Feustel took in $2,619,911 and that he expended the same amount. The suit for receiver was filed by the Evans Coal Company in February, 1919, and Mr. Feustel as receiver had charge of the affairs of the company for more than four years.

The record in the receivership case is said to be the longest in the history of the Fort Wayne courts.

The Indiana Service Corporation, Fort Wayne, Ind., is the successor of the old company and Mr. Feustel is the president of the Service Corporation.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons, New York, on May 2 there were sold 200 shares of New York City Interborough Railway, $215 lot.

Gold Bonds Offered.—Hoagland, Allum & Company are offering at 93 and interest to yield 6½ per cent $1,000,000 of first and refunding mortgage 6 per cent gold bonds, series of 1923, of the Iowa Southern Utilities Company. The bonds are dated Feb. 1, 1923, and are due Feb. 1, 1943. The company owns the electric interurban railway connecting Centerville, Mystic and Albia.

Interurban Pays Preferred Dividend.—The Fort Dodge, Des Moines & Southern Railroad, Boone, Ia., declared a quarterly dividend of $1.75 a share on preferred stock, payable on May 1. Previous to this declaration, the last dividend on the preferred was paid in scrip on May 1, 1921. The directors of the company did not act on the matter of the 12½ per cent accumulation on the preferred. The gross earnings for the year ended Dec. 31 were $2,244,501, increase $44,102 over 1921. Net earnings were $615,504, increase $256,247. Interest charges were $295,391, leaving a balance after interest available for depreciation and dividends of $320,112.

Small Accumulated Deficit for Los Angeles Railway. — The Los Angeles Railway Corporation reports to the California Railroad Commission for the year 1922 that its operating revenue was $11,118,873 and operating expenses $7,623,646, giving a net operating revenue of $3,495,227. Miscellaneous non-operating revenue amounted to $130,863. Interest, rent, taxes and other deductions totaled $2,247,313. The net corporate income for the year was $1,378,777. The deficit at the beginning of the year amounted to $1,165,064. Miscellaneous additions to surplus for 1922 amounted to $8,421 and miscellaneous deductions were $235,151, leaving an accumulated deficit at the end of the year of $13,017.

$10,000,000 of 7 per Cent Debentures Offered.—Public offering is being made of a new closed issue of $10,000,000 of 7 per cent sinking fund debenture gold bonds of the Illinois Power & Light Corporation at a price of 100 and interest, to yield 7 per cent. These bonds are a direct obligation of the corporation, which covenants to place no additional mortgage on its properties unless they are ratably secured by the lien thereof, and to issue no additional debentures if the holders of one-third of the principal amount of the present issue object thereto. The company is the successor to the Illinois Traction Company and other properties as noted previously in the ELECTRIC RAILWAY JOURNAL.

Company Making Progress.—During March the Boston (Mass.) Elevated Railway carried 34,691,068 paying passengers and collected $3,027,502 in fares. This was the largest month's business in the history of the company. It set a new mark for railway results. It brought its reserve fund, for the repayment of a debt, up to $958,648, and there is every indication now that the company will have more than $1,000,000 to pay on July 1 to the communities which taxed themselves some years ago to cover the company's deficit from operation. Total receipts in March amounted to $3,097,995 as against $2,868,518 during the corresponding month a year ago. The company is making such good progress, financially, that it is in a position this year to start its trackwork on time. It had an excess of receipts over cost, for March, of $335,937.

Traffic and Transportation

Ten Cents in Seattle

Council Votes a Return to Higher Cash Fare with Fifteen Tokens for One Dollar

The City Council has voted to return to the 8½-cent ticket fare on the Seattle Municipal Railway after an experiment since March 1 with a 5-cent fare. Council members agreed unanimously on the return to the higher fare on the recommendation of Superintendent Russell. Corporation Counsel Kennedy has been instructed to draft an ordinance restoring the former fare of 10 cents cash or token fares of 8½ cents, the only concession over the previous fare to provide fifteen tokens for $1, or seven for 50 cents.

The new fares cannot become effective before June 15 or July 1, as Mayor E. J. Brown has announced that he will veto the ordinance. However, the Council has enough votes to pass the measure, but it will take about thirty days to put it in effect after it is passed. In the meantime, if the present losses continue, the deficit will reach approximately $500,000 before the change can be made.

Mayor Brown states that he will continue his efforts to have the purchase bond redemption date extended. Corporation Counsel Kennedy advised the Council that if necessary the present issue of revenue bonds issued in payment for the street railway may be refunded. Few city officials believe that the bondholders will agree to any refunding or other method of extension of their bonds.

Losses through operation under the 5-cent fare during the early part of April showed an increase of $102 a day over the average for the month of March. This brings the average daily loss to $4,577.

Courtesy Week in Los Angeles Accomplished Good Results

Co-operating with the Kiwanis Clubs International in "Courtesy Week," April 15 to 21, the Los Angeles Railway accomplished good results toward mutual courtesy between trainmen and employees. Three days before courtesy week began posters were displayed in the cars announcing "next week is Courtesy Week."

During courtesy week an appropriate car card was displayed in the cars and ribbon badges with the words "Courtesy Week, April 15 to 21," were issued to trainmen with the request that they wear them while on duty. The wearing of the badge was not, however, compulsory.

A contest, in which cash prizes were given for the best ideas in promoting courtesy between trainmen and passengers, was conducted in the week preceding courtesy week and served to direct the thoughts of trainmen along the lines of courtesy. These ideas were relayed to passengers through "A-Z-U-R-I-D-E," a pamphlet distributed on the Los Angeles Railway cars by the public relations department.

Members of the Kiwanis Club were given the courtesy week badges and requested by their officials to wear them.

Newspaper publicity supplemented the other efforts to keep the campaign before the public.

Bus Regulatory Bill in Ohio Now a Law

The Public Utilities Commission of Ohio will hereafter control bus operation. The House and the State Senate recently passed the bill, which became a law without the signature of the Governor. It will become effective in ninety days.

The bill gives the commission the power to supervise and regulate all motor bus companies, fix their rates, regulate the service and safety of operation, require filing of annual reports and provide uniform accounting systems. The commission is to have authority over the bus companies to the exclusion of local communities.

Double-Deck Cars Suggested for Detroit

The use of double-deck street cars has been suggested to the Street Railway Commission of Detroit by W. F. Evans, president of the Detroit Motorbus Company. As Mr. Evans sees it, such cars in operation would reduce operating costs and aid materially in solving the problem of mass transportation.

Mr. Evans pointed out that the $5,000,000 bond issue recently authorized by the city cannot buy all the cars and build all the extensions needed. By purchasing double-deck cars such as were built for experimental use along Broadway in New York and running buses hired from the Detroit Motorbus Company for 25 cents a bus-mile, Mr. Evans holds that the city would be in a position to make that $5,000,000 really aid materially in improving the Detroit street railway service.

Mr. Evans lists the principal items of economy in the use of the double-deck car from a strictly cost standpoint. These, he maintains, are lower maintenance cost per passenger, less power cost per passenger, less platform cost and less investment per passenger. Double-deck cars also afford a reduction in the schedule running time due to the fact that less time is consumed per passenger in loading at the start.

$9,000,000 Valuation Upheld

Superior Court of Pennsylvania Finds State Commission Was Correct in Deciding Scranton Rate Case

As was reported in the ELECTRIC RAILWAY JOURNAL, issue of April 28, the Superior Court of Pennsylvania on April 19 affirmed the findings of the Public Service Commission in the matter of the valuation and rates of the Scranton Railway. This means that the court upheld the commission valuation of $9,000,000 on the property of the company as a basis for the 8-cent fare. The present decision is the result of the city's appeal against the commission's ruling. The fare problem had its beginning in the franchise ordinance which limited the rate to be charged by the company within the city of Scranton to 5 cents. In 1917 the company filed a 6-cent rate with the commission and in 1918 a second schedule was filed increasing the fare from 6 cents to 8 cents. Against both increases the city of Scranton complained on the ground of their being illegal and unjust.

The Public Service Commission then filed a preliminary report holding that the fare limitation prescribed by the ordinance had been superseded by the passage of the Public Service Company law. It suggested a conference of engineers representing the railway and the city to decide on the valuation of the property, but meanwhile established a temporary fare of 7 cents cash or four tickets for 25 cents. From this order the city appealed to the Superior Court. That court affirmed the order of the commission. The Supreme Court has now in turn affirmed the lower court ruling.

Proceeding with the matter of the valuation the commission after careful consideration arrived at a value of $9,000,000. The Scranton Railway was then directed to advertise a new tariff providing for an 8-cent cash fare, with tickets to be sold at the rate of four for 30 cents, this schedule to remain in force for a period of twelve months. The city of Scranton did not appoint an engineer to represent it at the valuation conference, but it did appeal from this determination of the commission. In its brief the city stated that the questions involved were:

1. The determination of the fair value of intervener's property used and useful in the public service, under the public service company law of 1913.

2. A determination of a just and reasonable rate of fare on respondent's lines within the city of Scranton.

The court referred to the public service company law, which conferred on the commission power to determine the facts and conditions in each case which must control in the fixing of rates to be charged. Further, the court contended, the public service company law empowered the commission to determine the fair value of the property and to revalue such property from time to time. In the case of the Scranton Rail-

way the court ruled the commission complied with the provisions giving all interested parties a patient hearing. Further, the court said that it was without authority to set aside a finding of fact by the commission which was supported by substantial evidence when no constitutional question was involved.

One of the main points in the controversy was the question of the original cost of construction and the reproduction cost of the property. The engineering conference submitted a figure of $7,899,965 for the original cost of construction. The city contended that the original cost of the property was only $5,585,334. The city also contended that the engineering conference in its report as to reproduction cost included items which ought not to have been considered and put an extravagant estimate upon others. The engineering conference submitted a report upon the cost of reproduction new of the property based upon three different unit prices. These were:

1. Prices as of Nov. 1, 1919.
2. Average prices for 1914 to 1919, inclusive.
3. Current prices for the year 1914.

The commission did not accept in its entirety the report of the engineers as to the reproduction cost of the property, but reached the conclusion that the reproduction cost new, exclusive of going concern value and accrued depreciation, as of the several dates, should be fixed as follows:

As of Nov. 1, 1919, at $10,075,000.

As of unit prices for the period 1914 to 1919, inclusive, at $7,000,000.

Under 1914 prices at $6,300,000.

Figuring that the cost of reproduction of the plant as of prices prevailing in November, 1919, would have been $10,075,000 and that depreciation amounted to $1,219,715 the commission arrived at a construction cost less depreciation of $8,855,285. The court concluded that if to this was added the cost of financing—which the engineers found should be allowed—the property was valued at more than $9,350,000 without any allowance for going concern value, although the engineers testified to an amount for going concern value.

To the argument of the city that the 1919 prices were abnormal the court responded as follows:

> That may be possible, but to what extent they are abnormal we cannot say, under the evidence in this case, with that certainty which ought to characterize judicial action. Furthermore, the commission did not fix the valuation of the company's property at $10,000,000 nor did it base its findings upon the unit prices prevailing in 1919. Should prices hereafter decline more rapidly than they have since 1919 it may be that there should be a revaluation of the property here involved, that the statute authorizes that to be done. We are not convinced that the finding of the commission was without substantial evidence to support it.

The city finally argued that even if the valuation of the property of the railway is sustained, the rates of fare fixed by the final order of the commission will produce a revenue in excess of a reasonable return upon the property used in the public service. The court ruled that that argument depended upon the assumption that there would be a very considerable increase in travel after people get used to paying the 8-cent fare and that the revenues of the company would thus be greatly increased. Further, that this was largely a matter of speculation and theory and that it would not be warranted in placing upon a foundation so insecure a decision that the determination of the Public Service Commission is unreasonable and not in conformity with law.

The order of the commission was therefore affirmed and the appeal dismissed.

West Penn Railways Men to Be Rewarded for Accident-Prevention Effort

Although comparative records indicate that the West Penn Railways, Pittsburgh, Pa., is relatively free from accidents, an effort is being made still further to decrease the number of accidents by an accident prevention contest started at the beginning of the year.

In this contest trainmen on each division of the system are divided into teams and at the end of each quarter the team having the fewest number of accidents on the respective divisions is given a dinner by the company.

Some teams have come through the first three months without an accident. This is all the more remarkable in view of the fact that many slight collisions and unusual occurrences are considered as accidents.

The company's past experience was that most accidents occurred among passengers trying to board or alight from a moving car. This class of accident has been practically eliminated by the use of closed vestibule cars and side mirrors. Most accidents involving the cars are now caused by collisions with automobiles. Records of the West Penn Railways indicate that approximately 60 per cent of its accidents are due to this cause, and that while accidents due to all other causes are constantly decreasing, this is more than offset by the increased number of automobile accidents. The majority of these are of such a nature that they can only be prevented by co-operation of automobile drivers.

Because of its appreciation of what has been done and to give encouragement to further effort the company recently announced that, effective May 1, cash rewards would be made to trainmen for each no-accident month. This reward will increase progressively with each consecutive no-accident month so that a trainman will be able to earn a total of $100 for the first twelve months of no-accident record. Trainmen continuing a no-accident record beyond twelve months will be rewarded $150 for second twelve consecutive months of no-accident record. The same rate as for second twelve months period will continue indefinitely for each consecutive twelve months of no-accident record.

Trainmen waiting to take out their runs have been stimulated by the contest to discuss among themselves ways and means of predicting the unexpected moves of pedestrians and motor vehicle drivers.

Common Sense Returning on Jitney Problem, Says Norfolk Paper

In commenting on the recent decisions with respect to the regulation of jitneys in Norfolk, Va., and vicinity the Norfolk *Dispatch* said in part in its issue of April 12:

> Two votes cast in Tidewater Virginia yesterday demonstrated the welcome fact that common sense is getting the upper hand in the matter of dealing with municipal and suburban transportation in general and with jitneys in particular.
>
> One of these votes was cast in Newport News by the people themselves, who, according to the jitney men and their apologists, are all for the jitneys and all against whatever railway may be operating in any given community. In Newport News the jitney men demanded the right to fix their own routes, while the city administration considered, of course, that jitney regulation should be in the hands of the Council. Under the charter of the city, the question was submitted to the voters. They voted against unregulated jitney operation and, by implication, for councilmanic regulation.
>
> The other significant vote was cast unanimously by the members of Norfolk's Council, upholding the recommendation of the City Manager that jitney operation between Norfolk proper and Ocean View be prohibited. If there had been no public interest in the proposed line to Ocean View, Council's vote would not have been especially significant—because it was so obviously right. But the fact that numerous residents of Ocean View and the vicinity asked for the operation of such a line made Council's firm stand on the matter significant.
>
> Council very wisely, and to the ultimate advantage of Ocean View and that entire section, decided that the jitneys must suspend and the railway must continue to give service—improved service, too.

Railway Opens Another Bus Line.—Jamestown Street Railway, Jamestown, N. Y., has opened its North Side bus line loop. Transfers issued on the North Side line are accepted on the other bus lines and on the cars of the railway.

Bus Matters in Poughkeepsie Awaited.—The Poughkeepsie City & Wappingers Falls Railway, Poughkeepsie, N. Y., is said to be considering the advisability of going over to bus service. The city is awaiting the railway's decision with respect to buses as agents in the city's transportation field. The City Council has refused heretofore to grant franchises to bus applicants, but the independent operators in urging their case have called attention to recent court decisions.

Runaway Car in Brooklyn Injures Many.—Thirty-six persons were injured on May 1 when a car of the Manhattan Bridge Three-Cent Line, New York, jumped the track of the "S" curve near Nassau Street at the Brooklyn end of the bridge. The vestibule of the car was demolished and great holes ripped in both sides as it bumped and rocked and swayed for more than 600 feet over the cobblestones of Flatbush Avenue extension, finally crashing into an iron pole and coming to a stop in front of the Technical High School at Concord Street.

Personal Items

J. A. Carmody Advanced

New York Central Railroad Has Appointed Him to Post of Superintendent of Electrical Equipment

J. A. Carmody has been appointed superintendent of electrical equipment, electric division New York Central Lines, to succeed C. H. Quereau, retired on pension. Under the scheme of organization of the department he reports to E. B. Katté, chief engineer of electric traction.

Mr. Carmody comes to his new job with an unusually all-round preparation. He is now in his forty-fourth year, and has had something to do with railway cars practically ever since he finished high school in Elizabeth, N. J., near which is his birthplace, Linden. After some preliminary training with the Crocker-Wheeler and the Diehl Companies, he became chief electrician of the John Stephenson Car Company. Leaving this concern he pitched right into the railway and railroad electrification game with the General Electric Company, for which he worked on car equipment in different parts of the country and on the fitting up of the first New York Central locomotive, the famous "6000," still running. Refusing an offer as master mechanic of an important interurban railway, he joined the New York Central force, in 1906, as general foreman of car equipment. This involved a lot of interesting work, for the railroad was having cars built by the American Car & Foundry Company at Berwick, Pa., and the St. Louis car company, equipped at the car works and tested on the General Electric Company's test track at Schenectady. Mr. Carmody had charge of inspection until the cars were accepted by the operating department of the railroad and put into service.

MR. CARMODY RETURNS AFTER TEN YEARS

Mr. Carmody left the New York Central in 1909, and there is a gap of thirteen years to be accounted for until his return in 1922, this time in the valuation department. He held several jobs in the interim. One was as valuation engineer with J. G. White & Company, appraising the property of the Capital Traction Company. Another was with the Safety Car Heating & Lighting Company, on railway, train lighting equipment. In the war-time period he was production manager at the Long Island City Works of the Wright-Martin Aircraft Corporation.

The return of Mr. Carmody to the New York Central was primarily for the purpose of appraising the traction lines of the New York & Harlem Railroad, but his preparation as outlined indicated him to be the logical man to succeed Mr. Quereau. His work now includes the direction of the shops at Harmon and North White Plains, where the seventy-three locomotives and the 286 motor cars are maintained.

A. J. Clarkson has succeeded Mr. Carmody, as general inspector, electric division, New York Central Lines. He is a graduate of the University of Illinois, where he spent five years, completing a combined course in electrical engineering and electric railway engineering, leading to the degree of B.S. in E.E. Passing up the opportunity for taking a vacation after graduation he immediately entered the employ of the New York Central on July 1, 1916. Since that date he has progressed steadily. Beginning as junior draftsman in the electrical department he was afterward successively draftsman, senior draftsman, inspector and assistant engineer. His work for the first 4½ years was on the design and inspection of electrical equipment for cars and locomotives. For the remaining time he has been engaged in the supervision of design and installation of new shop machinery and other improvements, and studies of shop operation in connection therewith. He has also made investigations of electric equipment in service. In his present position he is virtually assistant to the superintendent of electric equipment.



J. A. Carmody

Mr. Clarkson was brought up on an Illinois farm. He worked his way through college, where he made an excellent record.

Commission Engineer Will Become Railway Manager in Wausau

E. J. Steinberg, resident engineer in Milwaukee for the Wisconsin Railroad Commission for the past ten years, will resign on June 1 to become connected with the Milwaukee Electric Railway & Light Company. Mr. Steinberg joined the railroad commission engineering force in 1910 as a utility inspector. Three years later he was transferred from Madison to Milwaukee as resident engineer. Since then he has had charge of promulgating schedules upon which the street cars of the Milwaukee Electric Railway & Light Company are operated, as well as other administrative and regulatory duties involving public utility properties in the Milwaukee district. Mr. Steinberg was graduated from the University of Wisconsin in 1909, receiving a B.S. degree and in 1919 the university conferred upon him the degree of E.E.

James D. Andrew Becomes Vice-President of Stevens & Wood, Inc.

James Andrew has returned to his old love—the public utility engineering and construction fields—by accepting the post of vice-president and district manager of Stevens & Wood, Inc., with offices at New York and Youngstown, Ohio. Mr. Andrew's headquarters will be at Youngstown, and one of his first activities will be to take charge of the construction of the 200,000-kw. superpower plant to be erected by his firm on the Ohio River.

In returning to the public utility field Mr. Andrew resigned as president of the American Balsa Company, a subsidiary of the American International Corporation, with which organization he became connected in war times. Indeed, at the height of the shipbuilding period Mr. Andrew had the satisfaction of seeing 122 ships come into being while he was manager of hull construction. But before the ships could be built, it was necessary to have a shipyard. At that task he served in the vital position of general superintendent of plant construction for the American International Shipbuilding Corporation at Hog Island. It was the famous Hog Island problem that lured him in 1917 from his position as superintendent of station engineering for the Edison Illuminating Company, Boston.

Mr. Andrew was born in 1874. He was graduated from the Columbia School of Mines in 1897. His first three years in the workaday world were spent in erecting and testing engines for the E. P. Allis Company, Milwaukee. For the next three years he was mechanical engineer of the Metropolitan Street Railway, New York; and then he moved over for a like period with the New York Edison Company as chief engineer. Tempted by the commercial side, he next became general manager of the Virginia & Alberine Soap Stone Company in charge of production and manufacture. The public utilities claimed him again when the Boston Elevated Railway made him superintendent of power.

Once more Mr. Andrew left a railway to join a central station company—this time the Boston company as noted above. During 1916, however, he received leave of absence to go to South America for the Chile Copper Company to build a 40,000-kw. power plant and then place it in operation. Shortly thereafter his talents were placed at the disposal of his country.

F. H. Brown Placed in Charge of Pawtucket Lines

In order still further to better public relations there and to afford the Pawtucket system closer supervision, with an object of increased efficiency, the United Electric Railways, Providence, R. I., has opened an office in that city with a superintendent in direct charge of that division. Under this plan the people of Pawtucket find an official representative at hand where before it was necessary for them to journey to Providence.

F. H. Brown has accordingly been made superintendent of the Pawtucket Division. He has been with the United Electric Railways for nearly seventeen years. He gained his first railway experience in Worcester, where he worked as a conductor, gradually advancing until he was placed in charge of one of the carhouses of the Worcester system. Later he entered the employ of the Public Service Corporation in New Jersey as an inspector. He worked his way up to district superintendent in Elizabeth, N. J. In October, 1906, he went to Rhode Island as superintendent of the Northern Division and continued in that capacity up to the time of his appointment to the Pawtucket post.

Edward J. Coffield has been appointed superintendent of the Woonsocket division of the United Electric Railways. The lines in Woonsocket had been cared for previously by Mr. Brown as part of the Northern division.

Mr. Coffield was advanced to this position from that of inspector on the Woonsocket lines. His railway training and knowledge of operating conditions in Woonsocket and vicinity qualify him for these duties. Mr. Coffield is thirty-five years of age. He has been connected with the company since April, 1907, at which time he entered the employ as a motorman.

The system of the United Electric Railways embraces the cities of Providence, Pawtucket, Central Falls and Woonsocket and also a vast amount of suburban territory. The city of Pawtucket, with a population of 64,248, has many lines operating entirely within its borders and several lines running into Providence.

W. C. Fankhauser Appointed Examiner of Commission

W. C. Fankhauser, chief of the division of finance and accounts of the California Railroad Commission, has been appointed an examiner of the commission, in addition to his other duties. This will permit him to conduct examinations into financial matters in connection with the applications to the commission for authority to issue stock and bonds and other financial matters in connection with the commission's work.

Mr. Fankhauser has been associated with the commission since April, 1912. He began his work in the department of statistics and accounts, and was transferred to the stock and bond department in 1913. He was placed in charge of that department in 1917. In 1920 he was placed in charge of the department of finance and accounts, which was formed by consolidating the department of statistics and accounts and the stock and bond department.

Mr. Fankhauser is a graduate of Pomona College, Class of 1909, and in 1912 was given the degree of Ph. D. by the University of California. He is the author of "Financial History of California and a Study on Railroad Reorganization and Receiverships," prepared in 1917 for the Newlands committee of the United States Congress.

A. J. Anderson Made Manager of Tennessee Road

A. J. Anderson has recently been appointed general manager of the Union Traction Company, Nashville, Tenn. Attainment of this post has long been Mr. Anderson's silent ambition, but no providential concatenation of circumstances has had anything to do with his achieving it. Ever since Mr. Anderson entered the employ of the company in 1902 as a section hand he has had his eye on the post next ahead as his ambition, not a covetous ambition, but as a step in the achievement of things still greater. Thus it has been that Mr. Anderson, since his first job on construction, has served the company successively as conductor, motorman, ticket agent and assistant to the general manager. Up from the ranks often means just that and nothing more, but when, as in the case of Mr. Anderson, it means through the ranks with a turn of service in each step sufficient for the mastering of the details of the separate jobs, it has a meaning all its own. Opportunity is dead only to those who believe it to be dead. Mr. Anderson's career is a fair example of what may be accomplished by diligence and hard work, and proves that opportunity is ahead in electric railway work even for those non-technically trained. The road of which Mr. Anderson is the manager operates 25 miles of line, mostly suburban, and owns Rockland Park, a popular pleasure resort near the city.



A. J. Anderson

New Manager at Taunton Promises 100 per Cent Service

James H. Murphy, long a prominent street railway figure in Taunton, Mass., has been given operating control over the East Taunton Street Railway. The directors have voted him manager and elected him treasurer also. In fact, Mr. Murphy will do what he wants with the road, as he will have full authority for an indefinite period.

The East Taunton Street Railway has been in operation for twenty-five years. It was a good proposition up to four years ago, but then it slumped and has not paid a dividend since. In fact, it almost looked as though the permanent home of the Toonerville Trolley was in Taunton. But the East Taunton Street Railway is going to pay dividends, give fine service, etc., because Mr. Murphy says it will. There are Great Expectations in Taunton. Track improvements, overhauled rolling stock, better service than patrons have had for years, are only some of Mr. Murphy's plans. He will welcome suggestions and complaints, too, but after Mr. Murphy has had his way with the road for a time "there ain't going to be no complaints."

Many years ago Mr. Murphy was a tow boy in Taunton. Later he went into the machine shop. He served as driver on the horse cars and as starter and dispatcher. One of his big jobs was superintendent of Division 2, South of the Bay Street Railway, with offices in Taunton. This position was followed by his temporary appointment in 1916 as general superintendent of that division, succeeding in that capacity George F. Seibel.

In 1919 Mr. Murphy was made manager of the Taunton division of the Eastern Massachusetts Street Railway, at the time when the properties of the company were segregated with a manager as the operating head of each division.

Mr. Murphy's new position will in no way interfere with his management of the Taunton division of the Eastern Massachusetts Street Railway. In fact, an agreement has been reached between the two companies. The East Taunton Street Railway is to rent space in the carhouse of the Eastern Massachusetts Street Railway in Taunton and close up its own carhouse. The system comprises more than 10 miles of line.

J. I. Searles, who has been in charge of the railway systems of the Menominee & Marinette Light & Traction Company, at Marinette, Wis., and Menominee, Mich., since he joined that company in September, 1922, has become superintendent of the railway system of the Lake Superior District Power Company, formerly the Ironwood & Bessemer Railway & Light Company. His headquarters will be at Ironwood, Mich. Mr. Searles was formerly connected with the electric railway at Clinton, Iowa, and the railway at La Crosse, Wis., and Winona, Minn., of the Wisconsin Railway, Light & Power Company.

H. V. Jones has succeeded H. M. Myers as auditor of the Northeast Oklahoma Railroad, Miami, Okla.

Marion McMillan has been added as one of the vice-presidents of the San Antonio (Tex.) Public Service Company.

H. M. Preston, secretary of the Warren & Jamestown Street Railway, Warren, Pa., has also assumed the duties of vice-president.

C. J. Moor has succeeded A. L. Farquharson as general manager and purchasing agent of the Fort William (Ont.) Electric Railway.

E. W. Ford, formerly general superintendent of the Memphis Street Railway, has been elected vice-president and will have jurisdiction over general operation.

A. D. McWhorter, formerly superintendent of equipment and overhead lines of the Memphis Street Railway, has been elected general superintendent with jurisdiction over transportation, mechanical and overhead line departments.

W. Angus Reid is now secretary and treasurer of the St. Johns Light & Power Company, St. Johns, Newfoundland. The position was formerly held by F. J. Hunter, who was superintendent in addition to his being secretary and treasurer.

D. R. Ainsworth has resigned from the office of general manager of the Shelburne Falls & Colerain Street Railway, Shelburne Falls, Mass., which he has held for the past ten years. He will continue as clerk and treasurer. Edward S. Hunter becomes general manager and assistant treasurer.

Frank Kell has been promoted from vice-president to president of the Wichita Falls (Tex.) Traction Company. J. A. Kemp, who was formerly president, will take Mr. Kell's place. L. L. Allbritton, in addition to his duties as general manager and purchasing agent, will also act as secretary and treasurer.

Mark Barkwell has been made general manager of the Northern Cambria Street Railway, Patton, Pa., succeeding C. L. Calahan, resigned, the latter accepting a position in Maryland. The new official of the railway was for the past six years manager of the Clearfield Supply Company at Barnesboro and Clymer.

Charles A. Mead, chief engineer of the division of bridges and grade crossings of the Board of Public Utility Commissioners of New Jersey, has been appointed a representative of the American Society of Civil Engineers on the American Engineering Standards Committee, succeeding Martin Schreiber.

F. D. Jackson is now secretary and treasurer of the Port Arthur (Ont.) Civic Railway. The duties of treasurer were formerly performed by D. McIver and those of secretary by M. M. Inglis. Mr. Inglis, however, will continue as general manager and purchasing agent, which positions he formerly held along with the secretaryship of the property.

William Darbee has replaced D. F. McGee as a vice-president of the Panama Electric Company, Panama. Edmund George Ford, formerly auditor, has taken on the duties of assistant treasurer, and E. P. Summerson, secretary, has also become treasurer of the property. D. G. Beachler is engineer. In this capacity he succeeds W. F. Grimes, Jr., who was known as the electrical engineer.

Fred W. Putnam of Red Wing has resigned from the Minnesota State Railroad & Warehouse Commission, effective on May 1. He will practice law in Minneapolis. Charles Sterling, chairman of the Ramsey County Republican committee, was appointed by Gov. J. A. O. Preus to succeed Mr. Putnam, who was appointed in 1917 and re-elected in 1918 for six years, his term expiring January, 1925.

F. Raymond Latta, who for many years has been superintendent of transportation of the New York State Railways, Syracuse, N. Y., has been promoted to be assistant to John Duffy, general superintendent. The position of superintendent of transportation has been abolished. The move is to centralize all operating direction. The transportation department was organized about five years ago.

W. P. Strandborg, of the Portland Railway, Light & Power Company, Portland, Ore., president of the Public Utilities section of the Associated Advertising Clubs of the World, has been appointed a member of the general reception committee to receive 100 or more representative advertising and business men of the British Empire who will arrive in the United States the latter part of May for a tour of the Eastern and Middle Western sections of the country. The delegation will be composed of publishers, advertising specialists and representatives of large British industrial concerns. The party will attend the annual convention of the Associated Advertising Clubs of the World at Atlantic City early in June.

Col. Charles Keller, who has been engineer commissioner and chairman of the Public Utilities Commission of the District of Columbia, has become associated with the Byllesby Engineering & Management Corporation, Chicago. Colonel Keller's immediate assignment will be business manager of the El Dorado hydro-electric project, now under construction by the Western States Gas & Electric Company on the south fork of the American River near Placerville, Calif. This water power will have an initial installed capacity of 27,000 hp. and an ultimate capacity of more than 100,000 hp. Colonel Keller is an honor graduate of the United States Military Academy at West Point, having been graduated as No. 2 in the class of 1890. After graduation he took the usual post-graduate course, and for a number of years served as an assistant in various engineering districts throughout the country.

Henry R. Trumbower, member of the Wisconsin Railroad Commission since 1918, has resigned to accept an appointment with the United States Department of Agriculture in charge of an investigation of the economics of transportation as it relates to marketing and distribution of farm products. The regular term of Mr. Trumbower on the Railroad Commission expired on Feb. 1, but he was retained by the Governor. In his new position Mr. Trumbower will make a special study of the possibilities of extension of motor truck transportation of farm products. His work will be done in connection with the bureau of agricultural economics and the bureau of public roads of the Department of Agriculture. Mr. Trumbower was appointed to be a member of the Railroad Commission by Governor Philipp in 1916 to succeed Halford Erickson for the unexpired portion of his term. In February, 1917, he was reappointed to a full six-year term. Mr. Trumbower was a professor of economics at the University of Wisconsin from 1910 to 1918.

Obituary

Donald Strode Barton, former general manager of the Canadian Electric Light Company, Levis, and consulting engineer of the Quebec Railway, Light, Heat & Power Company, is dead. Mr. Barton was born in India and was educated in England. He went to Canada in 1900. He settled in Montreal and practised his profession there for five years, when he accepted the appointment as general manager of the Canadian Electric Light Company, and at the same time became consulting engineer of the Quebec Railway. When the Levis company was absorbed by the Quebec Railway he remained with the company in the capacity of consulting engineer.

Frank E. Russell, general manager of the Tucson Traction Company and the Tucson Gas, Electric Light & Power Company, Tucson, Ariz., died at his home in that city on April 15, at the age of sixty years. Mr. Russell suffered a breakdown in health in July, 1922, being taken with a severe attack of sciatic rheumatism which finally developed into pneumonia, from which a complication of diseases resulted. Mr. Russell began his public utility career with the Western Union Telegraph Company, subsequently becoming active in the organization of the Tucson Gas, Electric Light & Power Company in 1892. Shortly thereafter he was appointed general manager and remained as such until the time of his death, a period of more than thirty-one years. In 1910 the Tucson Company became a unit of the Federal Light & Traction Company, New York.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Extensive Car Rehabilitation Plan for D. U. R.

An extended program of car rehabilitation has been laid out by the Detroit United Railway for 1923. Eight trailers which were purchased three years ago for the Pontiac line will be equipped with motors, as the company has adopted the policy of using no more trailers on the Pontiac line. Fifteen of the older type of interurban motor cars are also being pushed through the shop for rebuilding into modern-type cars. The company is also rebuilding two of its 60-ton locomotives with box bodies so that they can be used for freight carrying in addition to hauling cars.

The shop program also includes the rebuilding of eight trail cars which were originally designed for p.a.y.e. entrance and exit at the front end. These will be changed by the elimination of the large front platform and the construction of a rear platform and a smoking compartment. There will also be a rearrangement of the heater system. In this way the cars can be used p.a.y.e. in the city and the fares can be collected in the usual way on the interurban run. Fifteen of the older type of city cars with a side aisle are also being remodeled and fitted with front and rear bulkheads and a change of the aisle to the center.

Two locomotives are being added to the equipment. The bodies are being built by the Cincinnati Car Company and Standard C-80 trucks are being used with 34-in. wheels. The electrical equipment will consist of Westinghouse 562-A-5 motors with H.L.F. control. Each locomotive will be able to haul fifteen trail cars These engines will bring the locomotive equipment of the company up to sixteen.

Existence of Trade Associations Approved by Chamber of Commerce

Approval of the existence of properly functioning trade associations for each important branch of industry and commerce in the country was voted by business organizations affiliated with the Chamber of Commerce of the United States in a preliminary referendum canvas on April 13. Eight separate propositions relative to the activities of trade associations were submitted.

The propositions were taken from the report of the special committee created by action of the board of directors of the national chamber in 1922 to "make a general survey of trade associations, consider activities of trade associations which are in the interest of the public and of the fields of enterprise which are represented."

Philip H. Gadsden, Philadelphia, vice-president of the United Gas Improvement Company, headed the committee as chairman.

The committee expressed itself as of the opinion "that, while a minority of trade associations may have engaged in practices which have laid them open to complaint under the law with respect to restraints of trade, the vast majority have proved their great value for the advancement, day by day, of the processes of production and distribution."

In expressing opposition to government control of trade associations, the committee said:

> The possibility that a trade association may err by violating a statute no more justifies any attempt on the part of governmental authority to control trade associations in all their activities than the possibility of illegal acts on the part of individuals warrants like supervision over all their actions. Such supervision would inevitably restrict the freedom of action of trade associations in meeting the problems which they exist to solve.

The committee laid down as its recommendations three rules with relation to the statistical activities of trade associations, as follows:

> Reports of members to their association should be accurate and sufficiently complete to prevent misconstruction.
>
> As distributed to the membership, the statistics should not be accompanied with any interpretation or other comment which could induce or facilitate concerted action on the part of the members.
>
> All statistics regarding prices should be confined to closed transactions, and should not refer to pending transactions or future transactions.

In summarizing its conclusions the committee said:

> The committee believes that trustworthy information concerning capacity, production, stocks, sales and prices is essential to the effective operation of industry and trade under competitive conditions. The voluntary reporting of such information to trade associations and the subsequent publication and dissemination of such information in a manner which makes it available not only to contributors but also to consumers and to the public generally is beneficial alike to the field of business and the public and does not constitute a restraint of trade.

$1,000,000 for New Buildings

Real estate and building activities of the Indiana Service Corporation, Fort Wayne, Ind., will involve nearly $1,000,000 before the completion of present plans. Half of this sum has been set aside for the erection of the first unit of the Spy Run Avenue-Kamm Street carhouse.

When complete with carhouses 290 ft. x 90 ft. and a washhouse 290 ft. x 25 ft. there will be an initial investment of $100,000. These buildings, together with twenty-eight tracks to be located between the carhouse and the Randolph Street side of the company's property, will be completed this year.

The first carhouse to be erected will be of the two-story type, the lower floor to be used for car repair and barn work while the second floor will contain the offices of the city lines, superintendent and clerks and rooms for the employees. In the second building to be erected will be the wash shop and other departments.

ELECTRIC RAILWAY MATERIAL PRICES—MAY 1, 1923

Metals—New York

Copper, electrolytic, cents per lb	16.50
Lead, cents per lb	7.65
Nickel, cents per lb	27.50
Zinc, cents per lb	7.10
Tin Straits, cents per lb	45.25
Aluminum, 98 to 99 per cent, cents per lb	25.75
Babbitt metal, warehouse, cents per lb.:	
Fair grade	65.00
Commercial	40.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$6.25
Somerset mine run, Boston	3.175
Pittsburgh mine run, Pittsburgh	2.00
Franklin, Ill., screenings, Chicago	1.95
Central, Ill., screenings, Chicago	1.575
Kansas screenings, Kansas City	2.625

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb	3.15
Tie plates (flat type), cents per lb	2.575
Angle bars, cents per lb	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.375
Steel bars, cents per lb	2.575
Ties, white oak, Chicago, 6 in. x 8 in. x 8½ ft.	1.50

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron (28 gage), cents per lb	4.00
Sheet iron, galvanized, (28 gage), cents per lb	5.25
Galvanized barbed wire, cents per lb	3.80
Galvanized wire, ordinary, cents per lb	2.75

Waste—New York

Waste, wool, cents per lb	12–16
Waste, cotton, (100 lb. bale), cents per lb.:	
White	11-13.50
Colored	8-13

Paints, Putty and Glass—New York

Linseed oil, (5 bbl. lots), cents per gal	1.17
White lead, (100 lb. keg), cents per lb	13.125
Turpentine, (bbl. lots), per gal	$1 42
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality), discount*	85.0%
Putty, 100 lb. tins, cents per lb	5.05

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb	19.375
Rubber-covered wire, No. 14, per 1,000 ft	7.75
Weatherproof wire base, cents per lb	19.50

Paving Materials

Paving stone, granite, 4 x 8 x 4, f.o.b. Chicago, dressed, per sq.yd	$3.50
Common, per sq.yd	3.10
Wood block paving 3½, 16 treatment, N. Y., per sq.yd	3.19
Paving brick 3½ x 8½ x 4, N. Y. per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu yd., N. Y	2.25
Sand, cu.yd., N. Y	1.25

Old Metals—New York

Heavy copper, cents per lb	13.75
Light copper, cents per lb	11.75
Heavy brass, cents per lb	7.50
Zinc, old scrap, cents per lb	5.00
Yellow brass, cents per lb (heavy)	7.50
Lead, heavy, cents per lb	6.75
Steel car axles, Chicago, net ton	24.25
Old car wheels, Chicago, gross ton	26 25
Rails (short), Chicago, gross ton	24.75
Rails, (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	14.25

Rolling Stock

Chicago Surface Lines will shortly purchase seven trailers to replace those lost by fire.

Wisconsin Public Service Company, Green Bay, Wis., expects to receive soon six new cars being built by the St. Louis Car Company for service in Green Bay.

Chickasha (Okla.) Street Railway is remodeling a nine-bench open car for one-man operation by placing the seats lengthwise, installing hand-operated gates and steps, closing the ends and sides with wire netting and installing fare boxes.

New York Central Railroad, New York, N. Y., has ordered thirty new multiple-unit cars, delivery to be about July 1. They are practically the same as the last lot ordered. This brings the total up to 286. The road has seventy-three locomotives. None has been added since 1916.

Lake Superior District Power Company, Ashland, Wis., recently lost an interurban car by fire which broke out when the car was midway between Bessemer and Ironwood. Interurban service will not be decreased as the company will operate on this line new equipment which it has just received.

Track and Roadway

Detroit Municipal Railway has a budget this year of $650,000 for special trackwork. This will include pieces all the way from a single frog to a grand crossing.

Montreal (Que.) Tramways will proceed shortly with a double-track extension on Rosemount Boulevard between Papineau Avenue and First Avenue, Rosemount.

Los Angeles (Calif.) Railway has installed a new crossover on Central Avenue north of Sixth Street for the convenience of cars operating out of Division 1.

Tennessee Electric Power Company, Chattanooga, Tenn., is at work on a program of improvements which calls for an expenditure of about $355,000. Of this amount $106,000 will be spent in the railway department.

Easton (Pa.) Transit Company will soon extend its lines to Twenty-fourth Street. H. H. Paterson, vice-president of the Lehigh Valley Transit Company, will go to Easton in the near future to attend a conference regarding the extension.

Trenton & Mercer County Traction Corporation, Trenton, N. J., will relocate the tracks on Pennington Avenue, from Prospect Street to Parkway, and place them in the middle of the street. A double track will be laid on Princeton Avenue, a distance of about a half mile.

Philadelphia (Pa.) Rapid Transit Company will be in a position to build several additional lines because Mayor Moore has permitted the five ordinances providing for cross-town trolley lines to become laws without his signature. In allowing the bills automatically to become laws, the Mayor yielded to the suggestions made by many persons who reside in the neighborhoods which will be served by the proposed lines.

Power Houses, Shops and Buildings

Hydro-Electric Power Commission of Ontario this year will spend about $1,000,000 for electric railway improvements. This includes a new carhouse and terminal in Toronto to be used jointly with the Toronto Transportation Commission. A new power house will be erected at Lake Simcoe and one or more new substations are on the program.

New Orleans, La.—The two 72-in. pipes which supply water for the plant of the New Orleans Public Service, Inc., at the foot of Market Street, in New Orleans, have been found inadequate since the installation of the new 20,000 kw. turbine. In consequence it has been decided to build a new reinforced concrete intake tunnel, 8 ft. x 10 ft., to cost with connections about $500,000. When in operation at its full capacity, the plant requires 11,570,000 gal. of water an hour. The work on the tunnel will be started when the water in the Mississippi River recedes to a lower level. The Commission Council and the Orleans Levee Parish Board have authorized the construction of the tunnel.

Trade Notes

W. J. Jeandron, American representative of Le Carbone brushes, sailed for Europe recently for a six weeks' visit to the factory at Levallois-Perret.

Borne Scrymser Company, New York, N. Y., announces the removal of its New York offices to the Whitehall Building, 17 Battery Place, N. Y.

Bridgeport (Conn.) Brass Company has announced the removal of its New York offices from the Woolworth Building to the Pershing Square Building. F. Morton Clark has been made district sales manager and Arthur J. Nelson sales manager of the fabricating division at the main office in Bridgeport.

Pure Carbon Company, Wellsville, N. Y., announces the recent establishment of a Minneapolis representative, the Charles A. Etem Company, 917-A Marquette Avenue, Minneapolis, Minn. This representative is in an excellent position to give personal engineering service on all brush problems and requirements in this territory.

Musashino Railway of Japan has placed an order with the Westinghouse Electric & Manufacturing Company, through Takata & Company, agents for the Westinghouse Company in Japan, for three electric locomotives, two motor car equipments and two trail car equipments. Each locomotive will be equipped with four Westinghouse 100-hp. motors geared direct to the driving axles, and will weigh 33 tons. The locomotives will be controlled by standard electro-pneumatic control and will operate over a 1,200-volt system. The mechanical parts for the locomotives will be furnished by the Baldwin Locomotive Works.

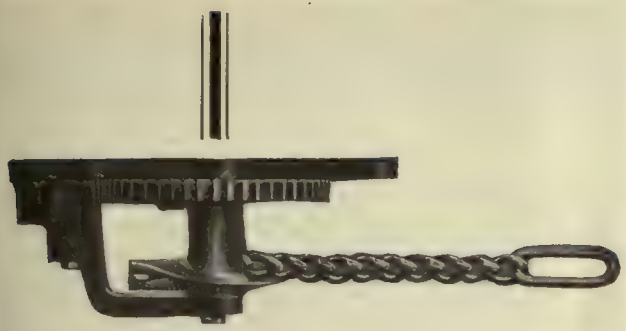
Allen B. Coffman has resigned as sales engineer for Crouse-Hinds Company, to become manager of the Philadelphia district for the Reliance Electric & Engineering Company, Cleveland, Ohio, manufacturer of electric motors. For the past three years while connected with Crouse-Hinds Company, Mr. Coffman made a study of different types of electrical installations in various industries from Pennsylvania to Florida. Previous to his association with Crouse-Hinds Company, he was assistant electrical engineer for the Philadelphia & Reading Railroad for approximately four years, having gone with it from the Pennsylvania Railroad electrical department. Mr. Coffman will continue to make his headquarters in Philadelphia and will be located in the Reliance Electric & Engineering Company's office in the Perry Building, Sixteenth & Chestnut Streets.

Chausse Oil Burner Company has been incorporated in Michigan to manufacture oil burning apparatus for asphalt street repairing, installation in electric railway cars, production of house furnace burners and the manufacture of oil burning hand torches. The company is incorporated for $100,000. Its officers are W. McK. White, president; W. G. Chausse, vice-president; Wray P. White, secretary. Offices have been opened at 206 Lincoln Building, Detroit, and plans are being made for location of a factory either in Detroit or in a near-by city. The apparatus which the Chausse Company will make has been produced in a small way for several years for use by steam and electric railways, street paving contractors and municipal boards of work. The 3-gal. Chausse torch, used for thawing switches and signal mechanism, has been a standard in steam railway signal departments for several years.

New Advertising Literature

Mica Insulator Company, New York, N. Y., has issued a circular, together with a revised price list and discount sheet, of its electrical insulating materials. The price list is got up for the convenience of jobbers, dealers and all those using insulation materials.

Lebanon Boiler Work, Philadelphia, and Lebanon, Pa., is distributing Bulletin 23-A, describing its Uniflow improved return tubular boilers. Among other things the bulletin points out that of 465,000 stationary boilers in the United States in 1920 (omitting those in the contracting field), 60 per cent were of the fire-tube type, mostly horizontal return tubular boilers.





The correct principle is there!

PEACOCK

Improved Brakes

utilize an eccentric winding drum

LEVERAGE applied when required and in the amount required, is the underlying reason for the striking success of Peacock Brakes.

The ordinary hand brake system, winding chain, as it does, on a little spindle or a circular drum, entirely misses the fundamental requirements for an adequate hand brake. That requirement is that it shall apply maximum braking power in the shortest possible time. With its fixed radius winding spindle, the ordinary hand-brake unit sacrifices either speed or braking power, or it must compromise between the two.

Both speed and braking power are gained with the Peacock patented eccentric chain-winding drum. The *eccentric* is right in principle. It gives fastest winding on the largest radius while the chain is loose—then as the chain tightens up, the smallest radius becomes effective in giving maximum pull on the brake chain.

Actual competitive tests have proved that the Peacock Improved Brake stops the car in the shortest time under practical service conditions.

Try them out yourself!

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Company, Limited, Montreal, Canada

Bankers and Engineers

Ford, Bacon & Davis

Incorporated

Business Established 1894

115 BROADWAY, New York

PHILADELPHIA CHICAGO SAN FRANCISCO

THE J. G. WHITE ENGINEERING CORPORATION

Engineers—Constructors

Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems

43 Exchange Place, New York

STONE & WEBSTER

Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

NEW YORK BOSTON CHICAGO

JOHN A. BEELER

OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT

52 VANDERBILT AVE., NEW YORK

SANDERSON & PORTER

ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO NEW YORK SAN FRANCISCO

A. L. DRUM & COMPANY

Consulting and Constructing Engineers

VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELFCTRIC RAILWAYS

76 West Monroe Street, Chicago, Ill.
215 South Broad Street Philadelphia, Pa.

THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ENGELHARDT W. HOLST

Consulting Engineer

Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management

683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER, MASSACHUSETTS

REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation

PIQUA, OHIO

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

ROBERT M. FEUSTEL

CONSULTING ENGINEER

Rate, Traffic and Reorganization Investigations

Fort Wayne, Indiana

STEVENS & WOOD, INC.

ENGINEERS

Design and Construction of Steam and Hydro-Electric Power Stations, Transmission Lines: Railroad Electrification and Industrial Plants.

Reports and Valuations

Management and Financing of Public Utility and Industrial Corporations.

Mahoning Bank Bldg. Youngstown, Ohio
120 Broadway New York

WALTER JACKSON

Consultant on Fares, Buses, Motor Trucks

Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.

143 Crary Ave., Mt. Vernon, N. Y.

HEMPHILL & WELLS

CONSULTING ENGINEERS

Gardner F. Wells John F. Layng Albert W. Hemphill

APPRAISALS

INVESTIGATIONS COVERING

Reorganization Management Operation Construction

43 Cedar Street, New York City

Parsons, Klapp, Brinckerhoff & Douglas

WM. BARCLAY PARSONS H. M. BRINKERHOFF
EUGENE KLAPP W. J. DOUGLAS

Engineers—Constructors—Managers

Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports

CLEVELAND 1570 Hanna Bldg.
NEW YORK 84 Pine St.

Byllesby
Engineering & Management
Corporation
208 S. La Salle Street, Chicago
New York Tacoma

KELLY, COOKE & COMPANY
Engineers
149 BROADWAY NEW YORK
424 CHESTNUT STREET PHILADELPHIA

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Montreal
Philadelphia Los Angeles Rio de Janeiro

J. ROWLAND BIBBINS
Engineer—921 Fifteenth St., WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation.
EXPERIENCE IN 20 CITIES

Transmission Line and Special Crossing
Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

ANDREW SANGSTER & COMPANY
Consulting Accountants
New York and Chicago
Rate Investigations Consolidations
Depreciation Studies Reports to Bankers
25 Broadway, New York

THE P. EDWARD WISH SERVICE
50 Church St. *Street Railway Inspection* 131 State St.
NEW YORK DETECTIVES BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

LEADERSHIP
QUALITY EDWARDS SERVICE
SINCE 1887

BY virtue of its success as manufacturers of railroad car fixtures during the past thirty-five years, the O.M. Edwards Company is qualified to design and make bus equipment of a very high standard.

Edwards Fixtures
Complete the Comfort of Passengers

Edwards Bus Window Fixtures are designed for ease of attachment, freedom from trouble, beauty of appearance and enduring service.

Edwards Anti-rattle Devices stop the jarring racket of loose window sash so annoying to passengers, and protect the glass from breakage because of too rapid dropping.

Used By Many Of The Best Known Bus Lines In America

Window fixtures
All metal sash balances
Sash locks and racks
Sash lifts
Anti-rattle compression devices
Metal stop casings and parting stops
Top, bottom and side weather stripping
Steel vestibule trap doors
Trap door locks and latches

The O.M. EDWARDS Co. Inc.
Main Office and Factory Syracuse, N.Y.
CHICAGO NEW YORK
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal and Toronto





Give 'Em Air

Air brakes are adjusted to operate best at certain definite pressures.

To get those pressures—and maintain those pressures, there should be no leaks.

Leaks in the air lines can be found and quickly remedied.

But most air is "lost" because of worn rings in the air compressor.

There you have it—it's all a matter of clearance.

For if the clearance permits the air to leak past the rings, it's like trying to carry water in a leaky bucket.

If the rings are badly worn there's no cure but new rings.

If the wear is not great, it can be stopped by the use of the correct grade of Lubricating Oil.

This is so. And we have proven it on thousands of cars by providing the right grade of *Texaco Electric Railway Compressor Oil.*

Texaco Electric Railway Compressor Oils are made in two grades—a summer grade and a winter grade—because the use of oils adapted to seasonal conditions is just as important on compressors as on any other piece of equipment.

Compressors lubricated with Texaco Electric Compressor Oil don't "smoke." This splendid lubricant holds compression so well that no excess oil is carried over to vaporize or cause that blueish cloud of "smoke."

This condition of perfect lubrication prevents wear as well as carbon in the cylinders. When air compressors are imperfectly lubricated the rings wear; oil leaks past—carbonizes. Carbon scratches rings and cylinder walls—more wear; more oil leakage and continual loss of compression.

On the other hand in a Texaco lubricated compressor the rings fit snugly after many miles of service. THAT means an efficient air compressor—one that delivers the full amount of air with each stroke.

You can tell a Texaco lubricated air compressor by its action. A few crisp beats and the air receiver is filled up to the required pressure. Your motormen don't have to wait for the air—it's there when they need it.

Remember this:—A leaky air compressor is like a boy filling a tank with a leaky bucket. He can do it but it takes more trips to get the work done.

There is a Texaco Lubricant for Every Purpose.

and they are unexcelled for the Lubrication of Street Railways, on Rolling Stock, in Power Plant or Shop.

TEXACO

THE TEXAS COMPANY

DEPT. R-J. 17 BATTERY PLACE. NEW YORK CITY

HOUSTON - CHICAGO - NEW YORK

OFFICES IN PRINCIPAL CITIES

TEXACO

THERMIT RAIL WELDS



Making a Thermit weld in Indianapolis—The Thermit reaction

No Joint Troubles for Indianapolis!

"Our experience based on four years is very favorable and is proven by our increased orders for 1922"—so says the Engineer of the Indianapolis Street Railway, which has already installed about 2,000 Thermit Welds.

The rapidly growing appreciation of street railways in favor of the Thermit Rail Weld is emphatically proved by the large number of Thermit welds ordered in 1922, which increased almost 300% over the previous year. An analysis of this increased business brings out some very striking facts:

1—A very large part of the increase is traceable to re-orders from customers who have been using the process for years, some for ten years or more, and who used it on a still greater scale in 1922 because of the excellent results previously obtained.

2—A very great part of the increase is due to business from properties who have never used the process before but who adopted it when they found out how efficient and economical it has proved to be on the other properties. Most of these new properties adopted the Thermit Rail Weld not because of solicitation on our part but on the recommendation of other customers.

If you contemplate any track construction tell us the approximate number of joints and section number of rail so that we can submit an estimate on the cost of eliminating your joints and prolonging the life of your track.

Metal & Thermit Corporation

120 Broadway, New York

PITTSBURGH CHICAGO BOSTON S. SAN FRANCISCO TORONTO

Report of Investigation of

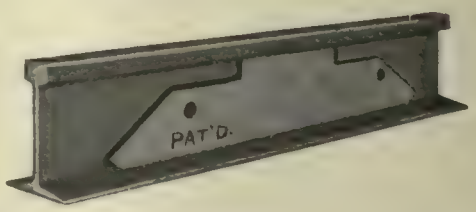
"INDIANAPOLIS"

Type of Welded Rail Joints

They Meet All Requirements

To Wit as Follows:

1. **Conductivity**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100%—Robert W. Hunt & Co., Testing Laboratories.
3. **Endurance**—11 Years in Service—Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity—from One (1) to Ten Thousand (10,000).
7. **Universal**—In use on **over** 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 properties.





WHY?

Because —

They are Scientifically Designed
A Special Product for a
Specific Purpose

Completely and Perfectly Effecting the
"CONTINUOUS RAIL"

"Perfection in Principle Proven in Performance"

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

J. J. Costello Boston, Mass. New England Representative

MERITAS LEATHER CLOTH

The Leading Leather Substitute

Endorsed as superior, after U. S. Army Tests

Meritas Leather Cloth has been a leader in this field, in both quantity and quality production for the last twenty years. It has been tried and consistently proved superior, in thousands of severe tests.

A digest of a report made by the Air Service, U. S. Army, contains a statement that Meritas Leather Cloth stood up better than any other ever seen at that testing station; that Meritas looks and works like real leather, and after many severe tests was found very satisfactory.

A supplemental report on the same subject states: "It is superior to practically all of the other samples of imitation leather upholstering fabric which have been used to date."

No service can be required of a leather cloth that is more severe than the thorough and exacting tests of the U. S. Government.

Samples for your specific requirements will be sent, on request.

THE STANDARD TEXTILE PRODUCTS CO.
320 BROADWAY, NEW YORK
Dept. E. R. J.

MERITAS STANDARD STP TEXTILE PRODUCTS BRAND REG. U.S. PAT. OFFICE





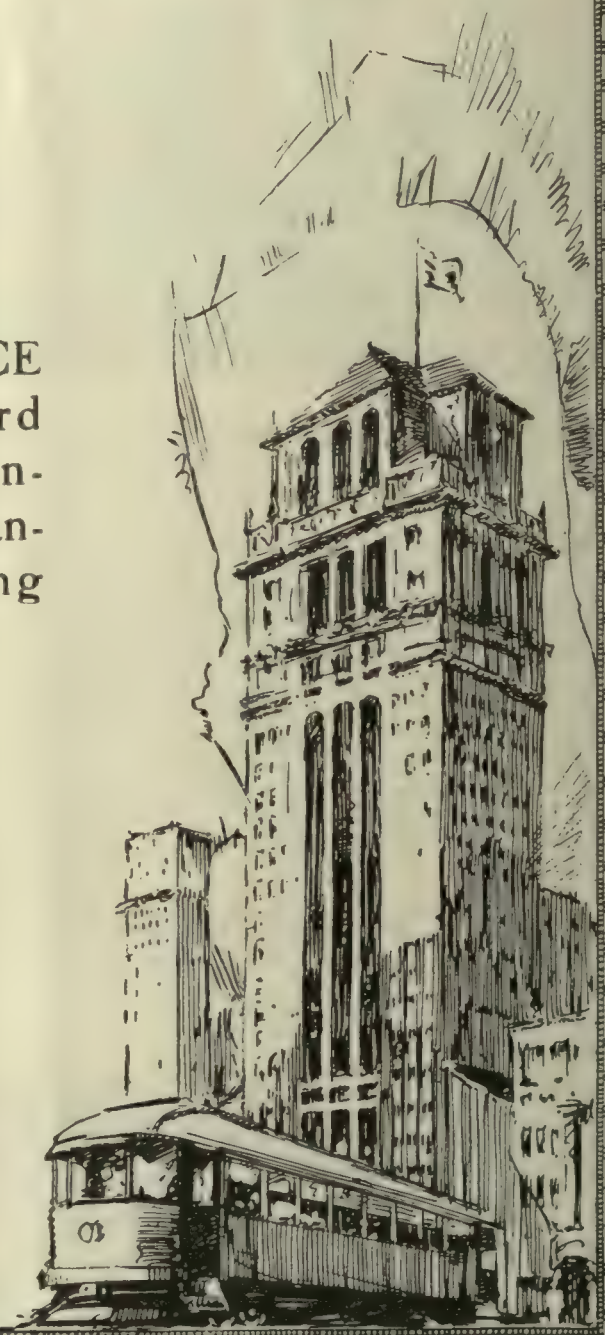
The Heat Test

Hold a lighted match under corner of Meritas Leather Cloth. Notice there is no rim of free oil preceding flame. There is no non-drying oil in Meritas to come to the surface, get sticky or stain clothes. Try this on other materials and see what happens.

The Abrasion Test

Rub the edge of a coin across the surface of Meritas Leather Cloth. Press hard. Do it repeatedly. No surface coating comes off and very little impression is made on the embossing. Try this on other goods and prove for yourself which stands the hardest wear.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



Barron G. Collier INCORPORATED

CANDLER BLDG NEW YORK

You can teach a parrot to say "Just as Good" but he doesn't know what he is talking about.

"Or Equal" is a dangerous way of specifying when desiring Consolidated Car Fender Equipments.

To cheapen the quality of materials construction and workmanship—to make something that covers the law—is not our policy. The Consolidated Car Fender Company's H-B Lifeguards and Fenders are built to save life, to withstand exposure, abuse and hard service to which equipments of this kind are subjected.

The name Consolidated Car Fender Company is your protection as it is our greatest asset.

When ordering or specifying stipulate that the guards or fenders be manufactured by the Consolidated Car Fender Company. It will pay you, and make a difference in your maintenance costs.

Send to us for prices and information when in the market for repair parts. We are ready to serve you promptly.

CONSOLIDATED CAR FENDER COMPANY, Providence, R. I.
Gen. Sales Agents—WENDELL & MACDUFFIE CO., 110 E. 42nd St., New York City



The COLUMBIA Armature Stand

The Columbia Armature Stand is a patented stand with a ten-inch height adjustment. It protects the equipment and because of its square thread screws, is easy for the workmen to handle.

The roller bearings are in cradles and there are pockets for table irons.

It can also be adapted to many shaft repair jobs about the shop, and will be found useful in other ways.

If your shop is not equipped with an adjustable armature stand, you will find it worth while to investigate the Columbia Adjustable Armature Stand.

NOTE—Our telephone number has been changed to Applegate 3200-1-2

COLUMBIA 18 92 MACHINE WORKS

3313 ATLANTIC AVE., BROOKLYN N. Y.





"It's a hard world!"

That's why—

we make Boyerized Parts so tough and durable. Rubbing up against a hard World, they need be. The life of brake pins, bushings and other wearing parts on a railway car truck is no easy one. There's no room there for delicate soft-skinned equipment. It's the tough, lasting, glossy-finished surface given by our patented Boyerizing Process, that more than triples the life of Boyerized parts.

Pins plus—

a cost-reducing opportunity which you cannot afford to over-look. Replacements required only one-third as often because they wear so much longer. Fewer pull-ins for brake failures. Accident hazard cut to a minimum.

Specify
***Boyerized* Brake Pins**

The BOYERIZED List

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
MacArthur Turnbuckles
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings

Boyerized Parts cost slightly more because they last three or four times as long as parts of ordinary untreated steel. Let us quote you on your requirements.

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Representatives:
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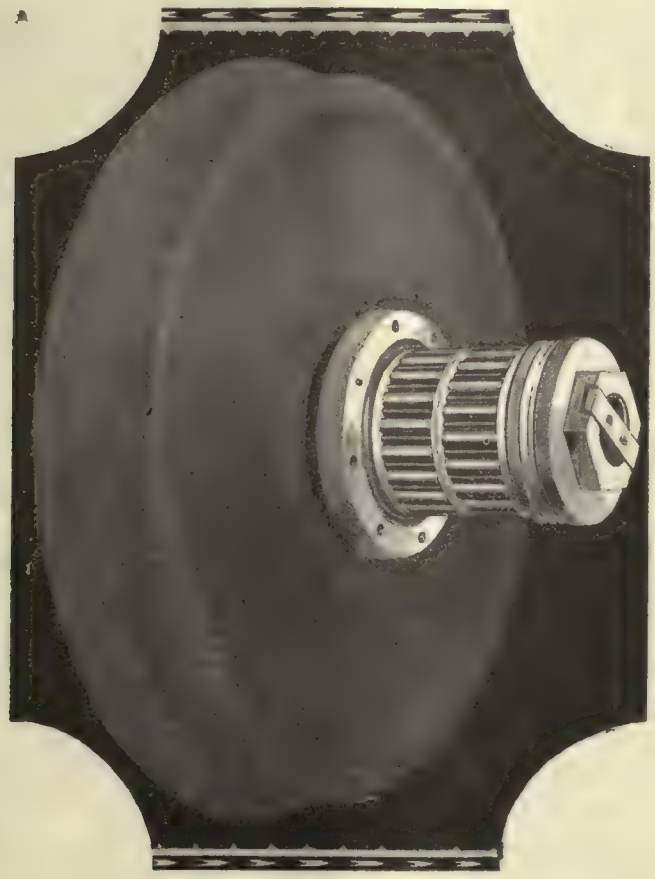
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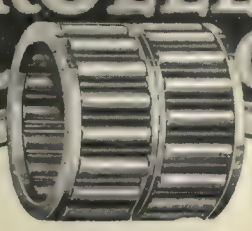
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Chicago, 4	Sayre, Pa.
St. Louis, 2	Berwick, Pa.
Buffalo, 4	Albany
Pittsburgh, 2	Toronto
Cleveland, 2	New Glasgow, N. S.
Amherst, N. S.	Madison, Ill.
Montreal	Huntington, W. Va.
Mich. City, Ind.	Wilmington, Del.
Louisville	Houston, Tex.
Mt. Vernon, Ill.	Hannibal, Mo.
Ft. Wayne, Ind.	Reading, Pa.
Birmingham	Baltimore
Atlanta	Richmond, Va.
Savannah	Ft. William, Ont.
Boston	St. Thomas
Detroit	Hamilton
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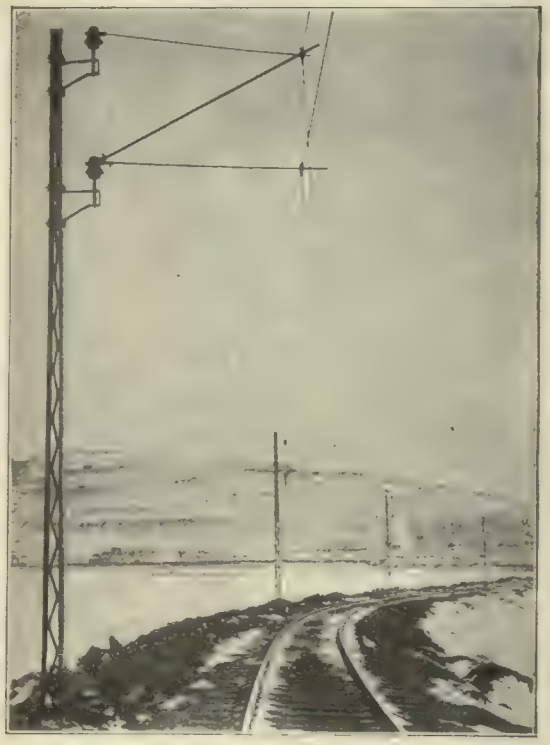
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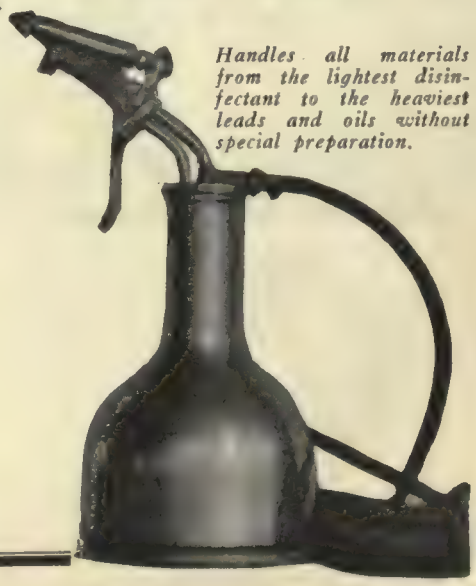
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2 Armatures and Fields

2—Armatures and Fields

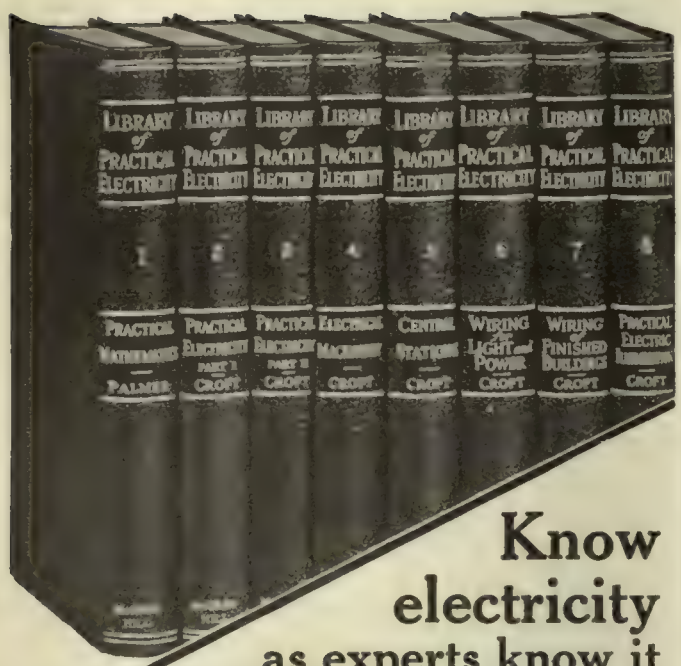
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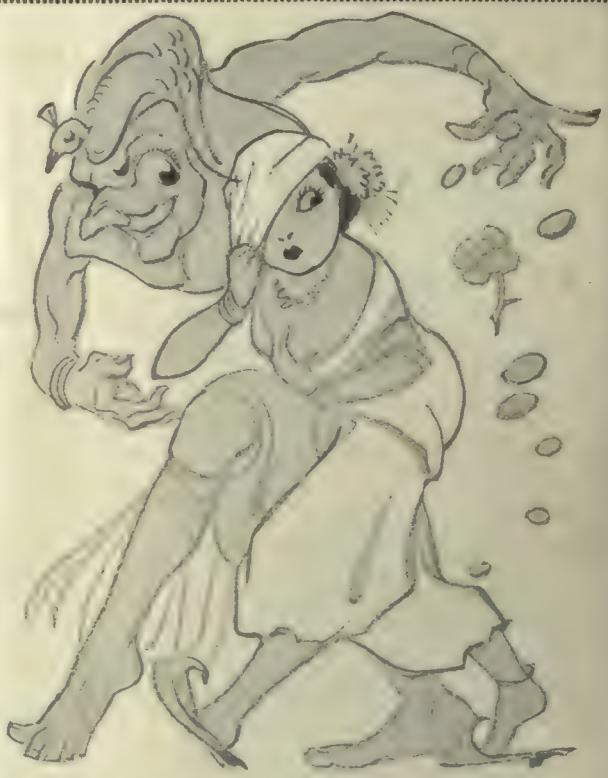
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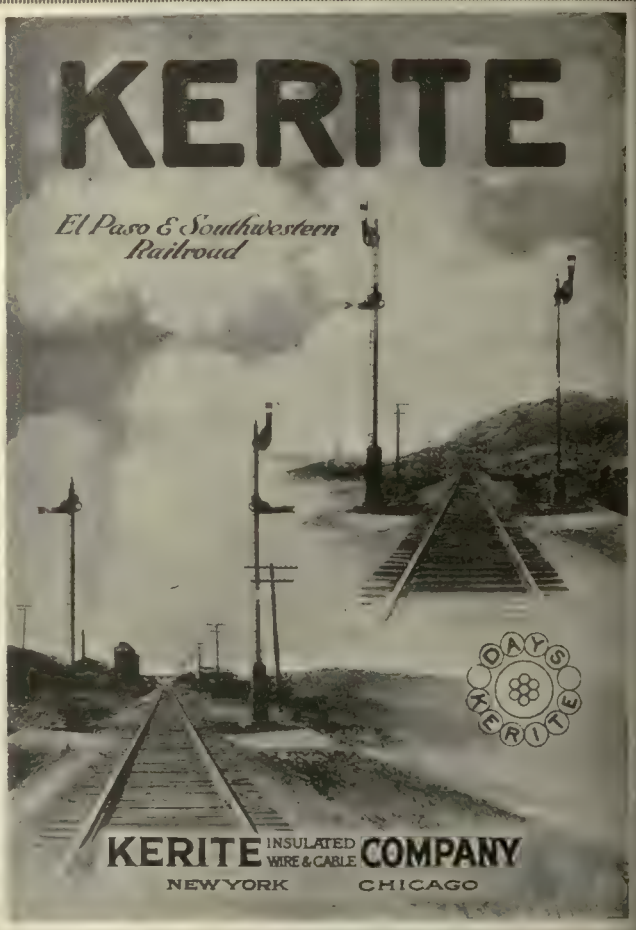
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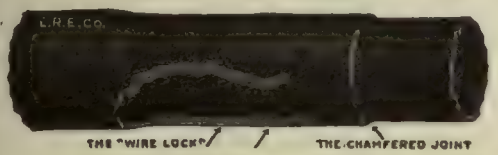
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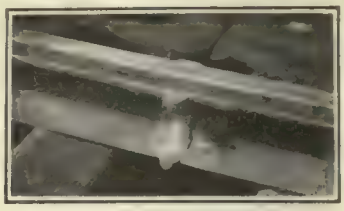
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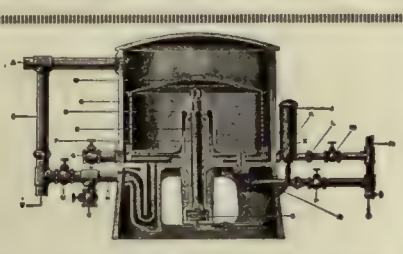
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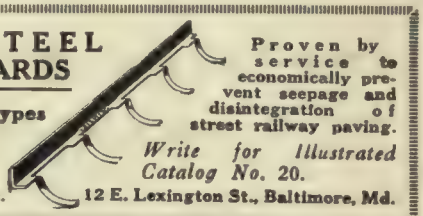
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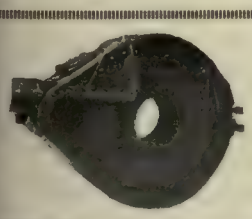
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Shaw Lightning Arresters

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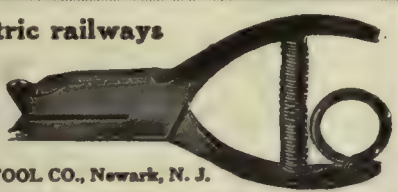
CORRECT IT
USE LE CARBONE CARBON BRUSHES

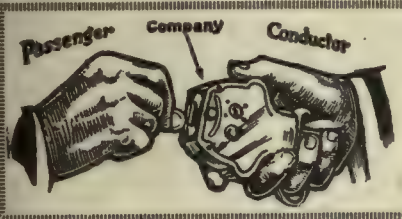
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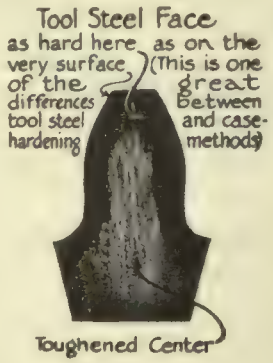


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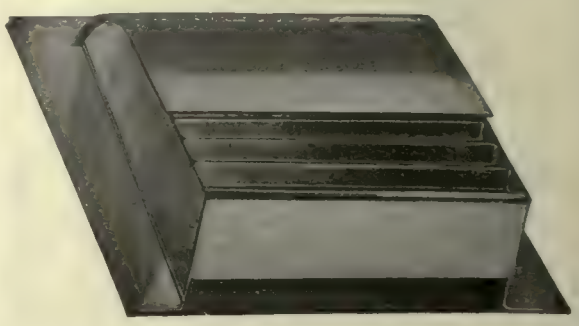
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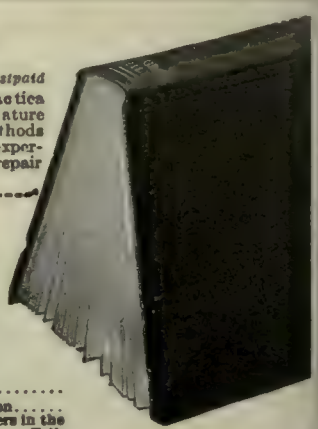
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Stafford Roller Bearing Car Truck Co.
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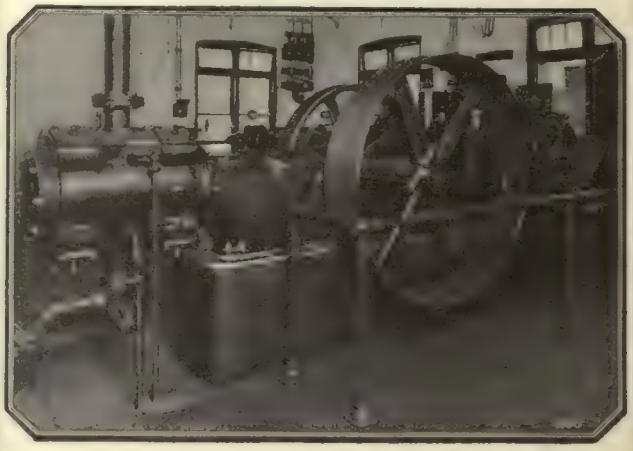


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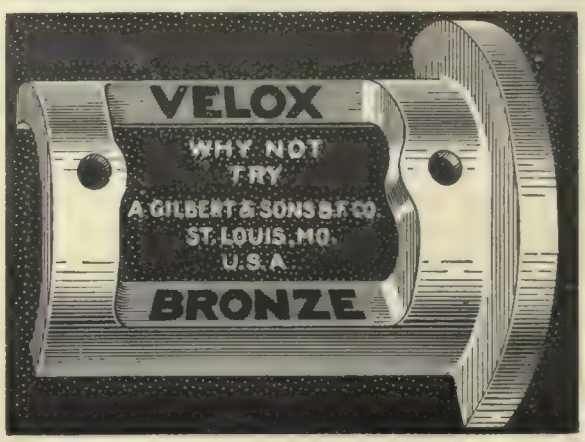
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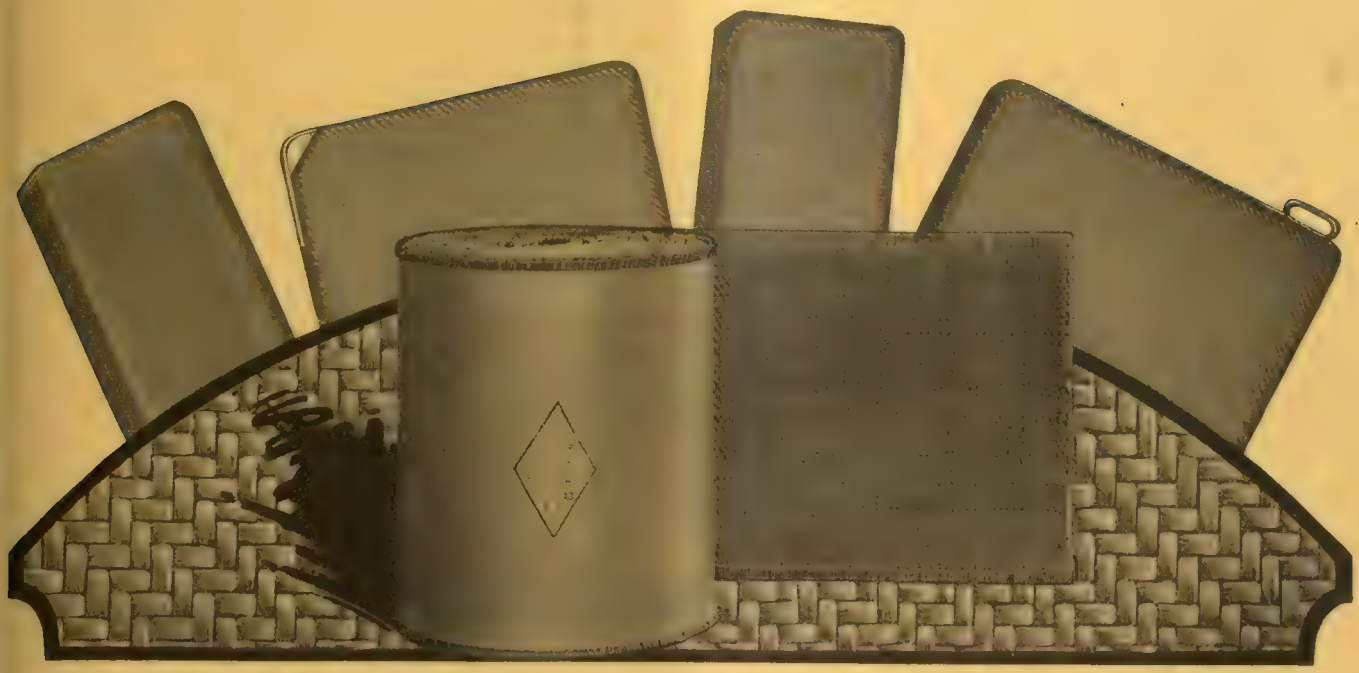
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all grades of poles; also any butt-treating specifications
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Old Seats Made New

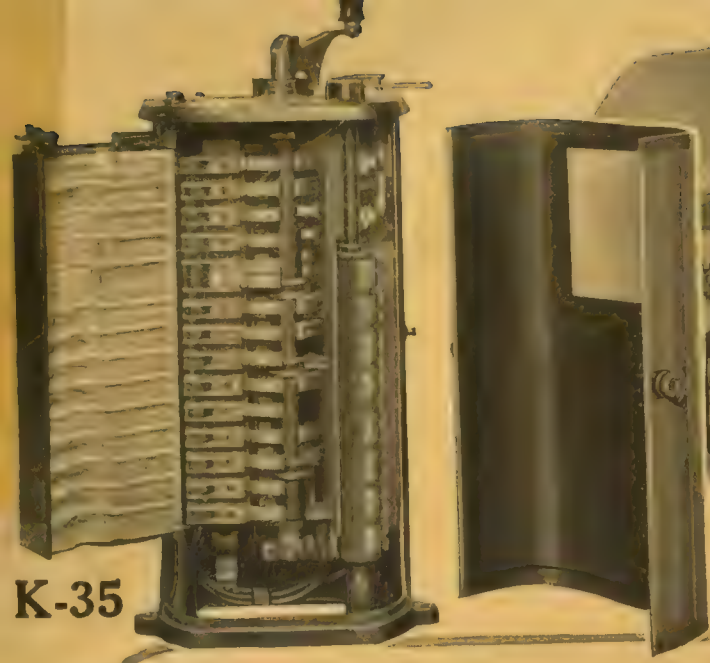
Brill Twill-Woven Seating Rattan

Old and worn looking seats will always detract from an otherwise attractive service. To maintain the clean and attractive appearance of your cars bright new seat covering of Brill Twill-Woven Seating Rattan will prove a valuable asset.

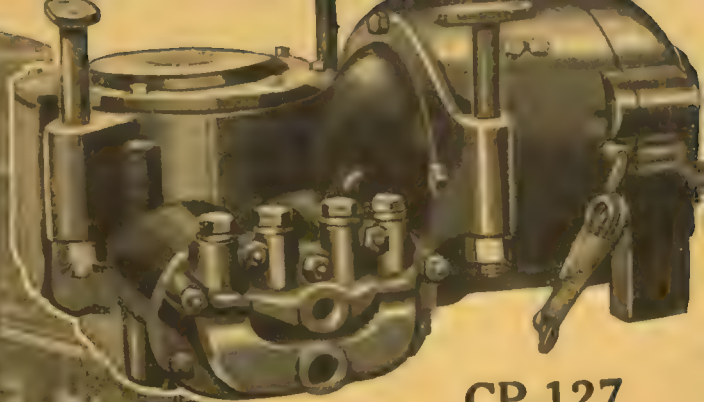
Manufactured from specially imported cane in our own plant both the canvas-lined and unlined Rattan is ready for shipment to you in widths from 14 to 36 inches.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.



K-35



CP-127

400 More Motors for Chicago

Successful operation of the GE-275 Motors on the Chicago Surface Lines has led to a repeat order for 400, making a total of 766 GE-275 Motors for that system.

The first 366 motors, ordered last fall, are for interchangeable use on double-end, wide-platform, two-man cars to handle trailers or on light-weight one-man cars.

These 400 additional GE-275 Motors will be used as four-motor equipments, with K-35 controllers and G-E Line Breakers. The Air Brake Equipment for these 100 cars is also "G-E", with CP-127 (20 cu. ft.) compressors.



GE-275

General Electric Company
Schenectady, N. Y.

GENERAL ELECTRIC

cGraw-Hill Company, Inc. May 12, 1923 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

A *"healthy thing"* for your profits

The manager of a large road recently said:

"Perhaps we have gotten into a rut. Let's look into this scientific lubrication.

"It is often a very healthy thing for our road, or any other road, to make a change. We many learn something by so doing."

Operators are custodians of large investments. In order to earn dividends, their investments must work. Every time a capital unit is out of service, they not only lose production, but profits. Correct Lubrication keeps capital units in service.

In many large central power stations throughout the country, Gargoyle D.T.E. Oil Light for Turbines is showing superior performance in terms of less sludge, fewer shut-downs, less make-up, fewer unit recharges per year.

We shall be glad to get in touch with you. Kindly address our nearest office.

GARGOYLE

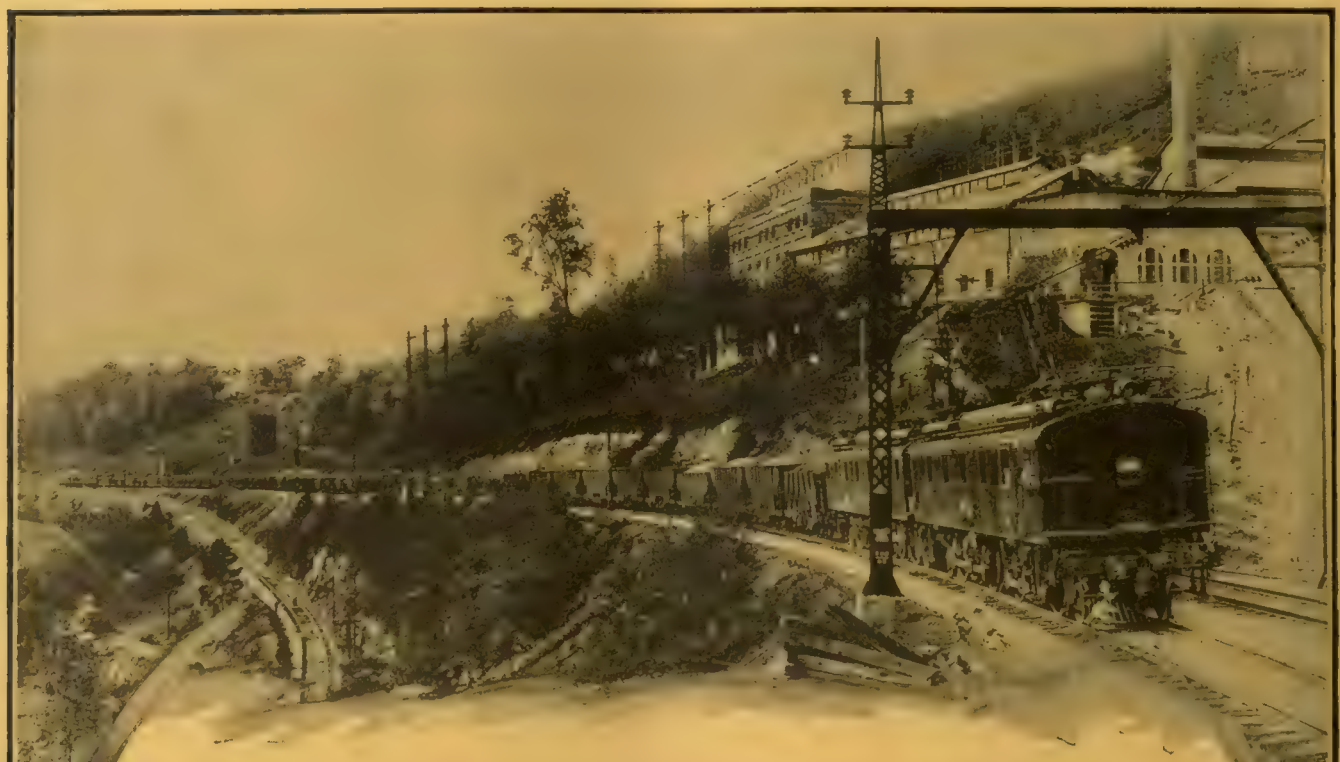
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Another Successful Alternating-Current Installation

Winding over and through the mountains of West Virginia, hauling approximately two million tons a month, the electric locomotives of the Norfolk & Western have more than met expectations.

As a proof of the successful operation of this alternating-current electrification, the Norfolk & Western Railway are extending their electrified zone a distance of thirty route miles.

This extension will insure a more rapid and efficient handling of the 3250-ton trains through this coal-mining region which includes the 2% Elkhorn grade over which these trains operate at a speed of 14 miles per hour.

Were steam locomotives used to handle the present tonnages the number required would be at least three times the number of electrics now employed.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

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"I'll Consult A Specialist"

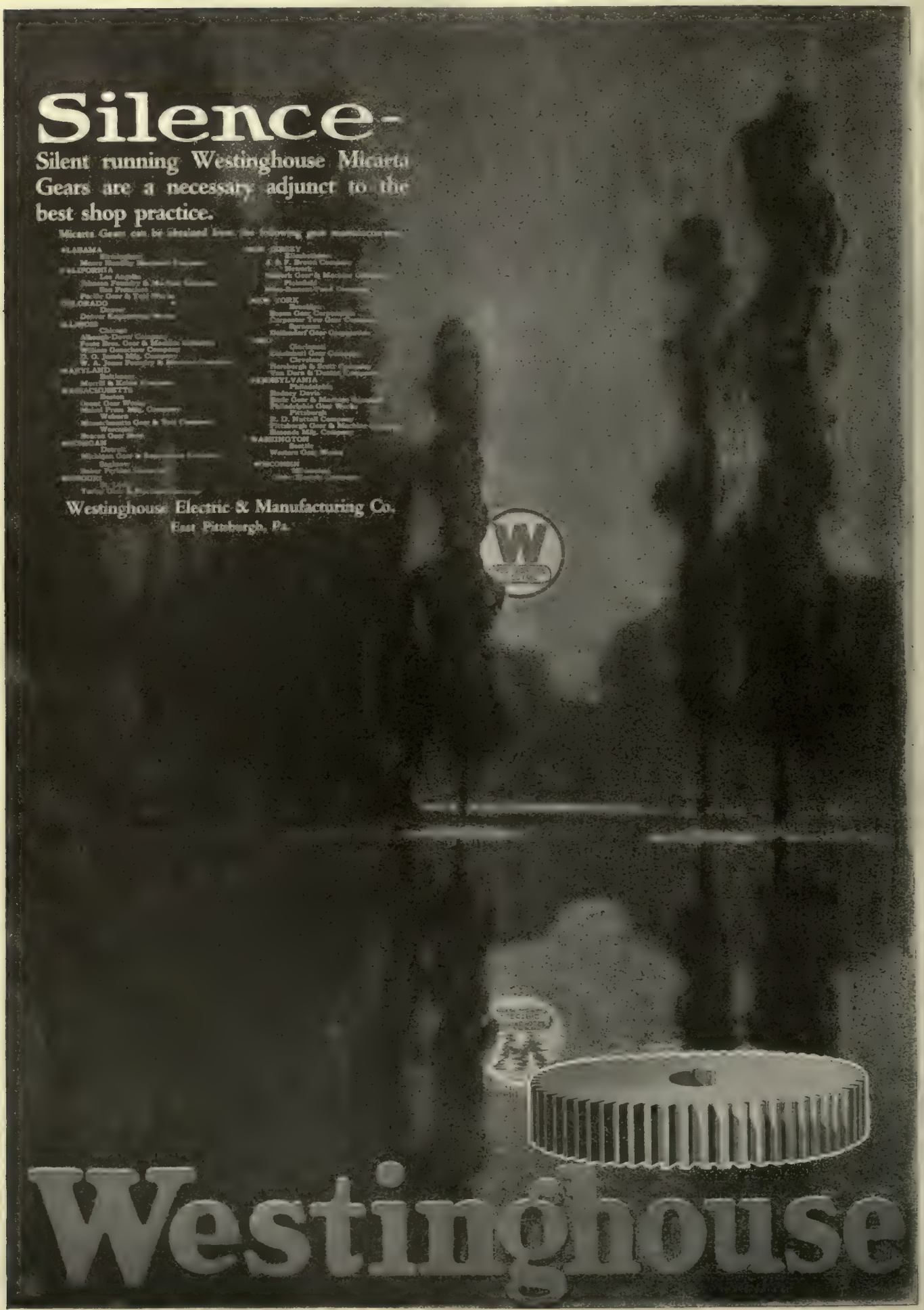
WHEN you made that decision you were certain the specialist could give advice, information, instruction you could not secure elsewhere.

You require the most reliable help in all branches of your electric railway work. For this you can turn with confidence to the specialist with international resources and reputation—ELECTRIC RAILWAY JOURNAL. You can get the correct answer to problems difficult of solution by a survey of the record published in the JOURNAL. Each number adds to the store of data from the experience of the whole field, studies prepared by experts, the latest and most helpful information assembled and presented by specialists. It is this usable sort of matter that the editors constantly seek out.

While it would not be possible for any one reader to pay for the exclusive services of the entire editorial staff and corps of technical writers and correspondents, each reader may benefit as fully by those services as though the entire work were done for him alone. If he will study the ELECTRIC RAILWAY JOURNAL with this thought in mind, preserve back copies and indexes and consult them frequently, he will have the constant service of this specialist who furnishes the last word on the developments of the art, and makes but one small charge a year. He will be numbered among the discriminating who are availing themselves of what some of our readers call "a perpetual college and post-graduate course."

Circulation of this issue, 5,950

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Silence-
Silent running Westinghouse Micarta Gears are a necessary adjunct to the best shop practice.
Micarta Gears can be obtained from the following gear manufacturers:
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Mears Foundry Supply Company
CALIFORNIA
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Schoen Foundry & Mchine Company
San Francisco
Pacific Gear & Tool Works
COLORADO
Denver
Denver Engineering Works
ILLINOIS
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Allmark-Dever Gear & Machine Company
Foote Bros. Gear & Machine Company
Illinois Gearcheck Company
D. O. Smith Mfg. Company
W. A. Jones Foundry & Machine Company
MARYLAND
Baltimore
Merrill & Kelso Company
MASSACHUSETTS
Boston
Grant Gear Works
Metal Products Mfg. Company
Wilson
Massachusetts Gear & Tool Company
Worcester
Reed Gear Shop
MICHIGAN
Detroit
Michigan Gear & Engineering Company
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Rose Gear & Machine Company
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Pittsburgh
E. D. Nuttall Company
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Rossmeis Mfg. Company
WASHINGTON
Seattle
Western Gear Works
WISCONSIN
Milwaukee
Falk Foundry Company
Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.
Westinghouse

Long Life Squeezed into O-B Extruded Ears



Section of extruded ear and boss installed with grooved wire. Note trolley wheel clearance. There are extruded ears for round, grooved or figure 8 wire.

Long life is literally squeezed into O-B Extruded Trolley Ears. Wearing qualities are actually forced into the metal—as extruded brass is exceedingly dense and tough.

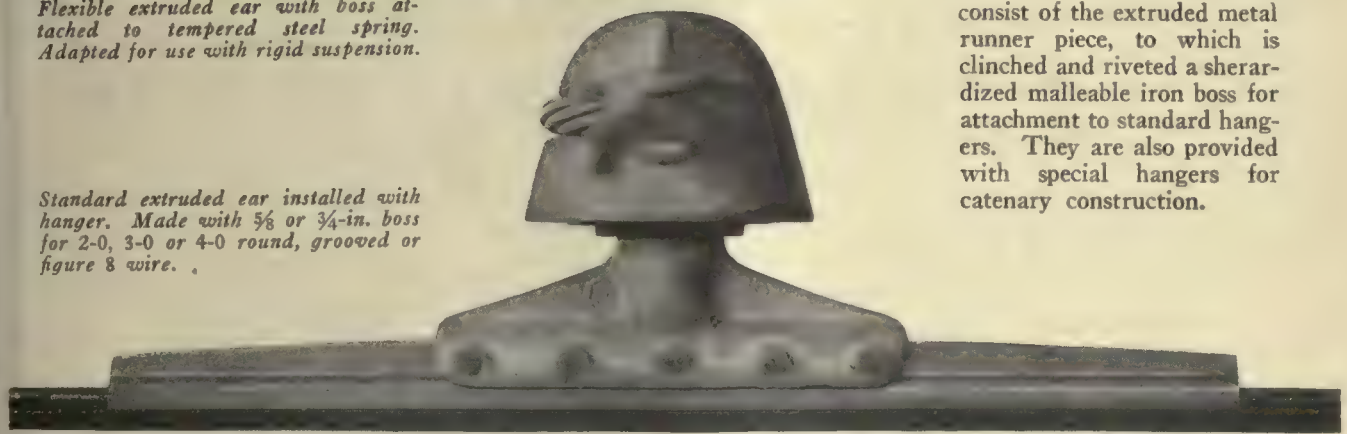
Red hot brass, not in the molten state, is forced at tremendous pressure through a die of the desired section of the finished piece. The result is a very uniform metal to exact dimensions.

Extruded ears fit the trolley wire accurately and offer a smooth underrun for the trolley wheel. The accuracy of the clinching of the trolley wire and the exceptional toughness of the metal mean long life under the constant pounding by the trolley wheel. Because the extruded metal is so dense, it does not curl.

Extruded ears, once in place, outlast the trolley wire—and make the wire wear longer, too.



Flexible extruded ear with boss attached to tempered steel spring. Adapted for use with rigid suspension.



Standard extruded ear installed with hanger. Made with 5/8 or 3/4-in. boss for 2-0, 3-0 or 4-0 round, grooved or figure 8 wire.

O-B Extruded Trolley Ears consist of the extruded metal runner piece, to which is clinched and riveted a sherardized malleable iron boss for attachment to standard hangers. They are also provided with special hangers for catenary construction.

The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

MEMBER ELECTRIC RAILWAY ASSOCIATION

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Insurance plus
Marsh & McLennan Service

A Worth While Saving

The Service of Marsh & McLennan Engineers results in a direct dollars and cents saving in insurance cost.

A large Eastern corporation, for example, was able to reduce its insurance cost from $17.50 per thousand to $4.30 per thousand, by carrying out the recommendations of our engineering service.

We will be glad to outline this service to business executives who are interested in reducing insurance cost.

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Trained Eyes and Steel Ties

IN the course of experience an Engineer develops unconsciously a faculty of measuring the strength of material with his eye—of checking without calculation by his visual perception the correctness of any construction—always when faced with this test Steel Twin Ties get the nod of approval.

THEY'RE big enough for the work they have to do—140 pounds of steel—156 square inches of bearing per track foot and this at no greater cost than wood ties in ballast—in many localities at a large first cost savings over wood ties in concrete.

See them in your 1923 construction.

We have for immediate delivery some stock joint plates either flat or flanged

THE INTERNATIONAL STEEL TIE CO.

Cleveland

Steel Twin Tie Track

Not How Little—
But How Much You Actually Receive

AT a meeting of the Railway Storekeepers' Association a Railroad man said to a lumberman, "When I was a young fellow working in a lumber yard and ordered a 2 by 4, I got a 2 by 4—two inches thick and 4 inches wide—but now you are asking us to take 2 by 4s that are 1-11/16 inches thick by 3-1/16 inches wide. How much smaller do you want us to take them?" The lumberman answered, "Just as small as you will take them." And he told the truth.

The condition in the Tie field is similar. If you do not adopt courageous tie inspection methods you will not get full value for your tie dollar. And when we say courageous tie inspection we merely mean to enforce the A. R. E. A. specifications and grade ties exactly according to the arithmetical dimensions and to have the courage to cull a tie that shows signs of decay, for a decayed tie cannot be made strong by preservation.

These are the methods used by the International Tie Organization. Every International Tie is a standard specification Tie, inspected carefully, graded and permanently marked.

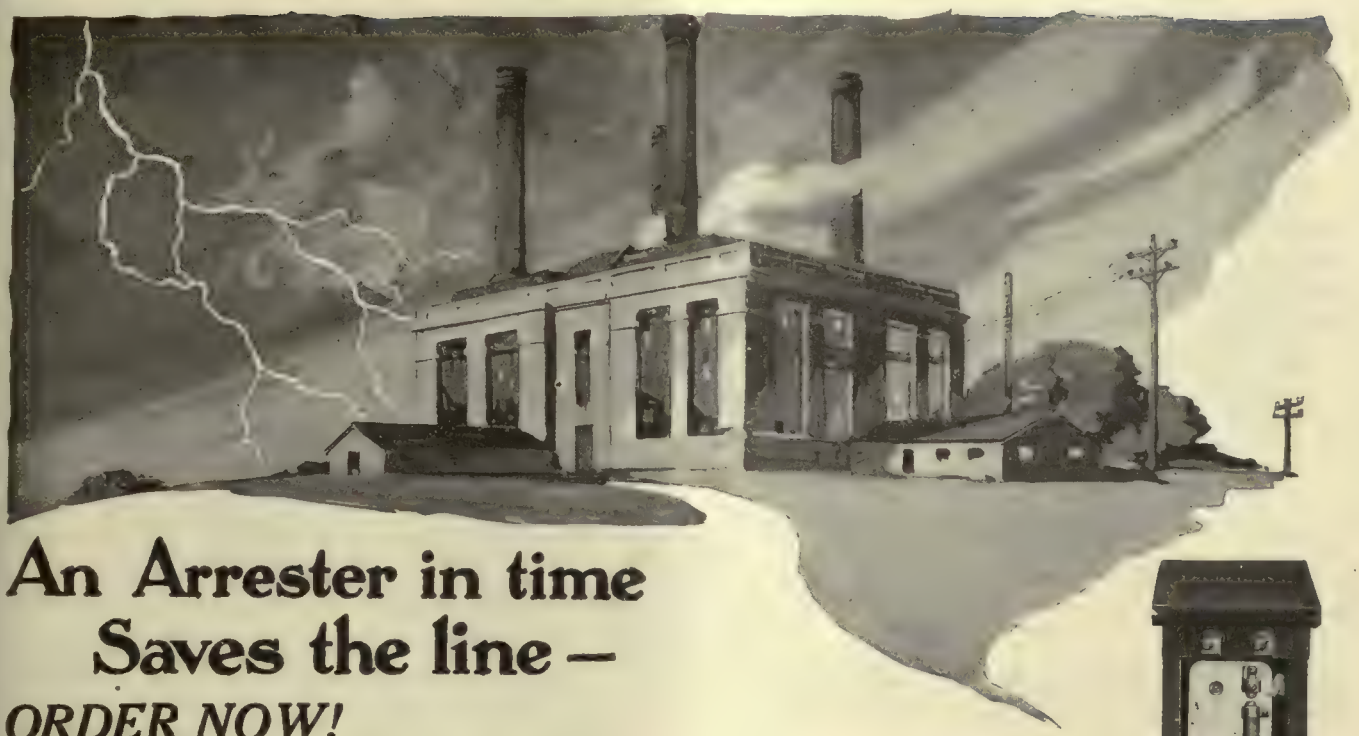
You benefit by our thorough inspection.



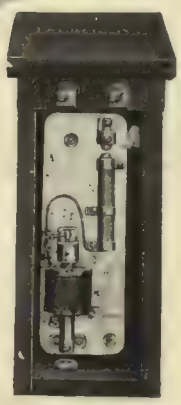
International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas



An Arrester in time Saves the line — *ORDER NOW!*



Garton-Daniels
D. C. Pole Arrester
Door Removed

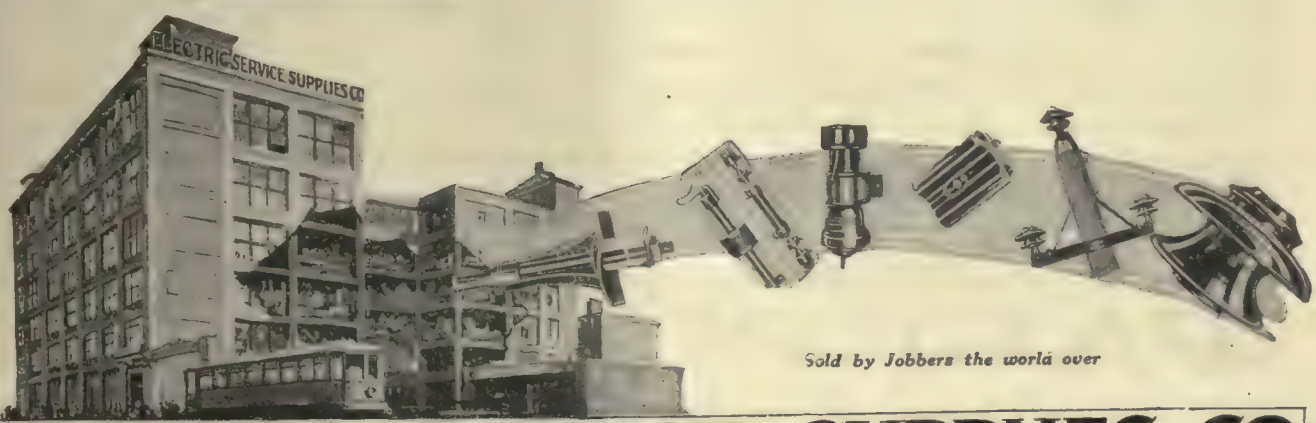
Garton-Daniels Arresters

KEYSTONE PRODUCTS

Keystone Expulsion Arresters
Garton-Daniels Arresters
Keystone Truss Pins
Locke Insulators
Keystone Triangle Arms
Never-Creep Anchors
Segur Winding Tools

Time is on your side now. It won't be in a short while, however. Unprotected lines might survive the *first* storm but there's little likelihood of them standing up against storm after storm all through the summer. And the damage then will cost double and treble the cost of protection with the justly famous line of Garton-Daniels Arrestors.

Before you order, however, you will want to look over Bulletin 189 on Keystone and Garton-Daniels Lightning Protective Apparatus. It will cost you nothing but a post card.



Sold by Jobbers the world over

ELECTRIC SERVICE SUPPLIES CO.

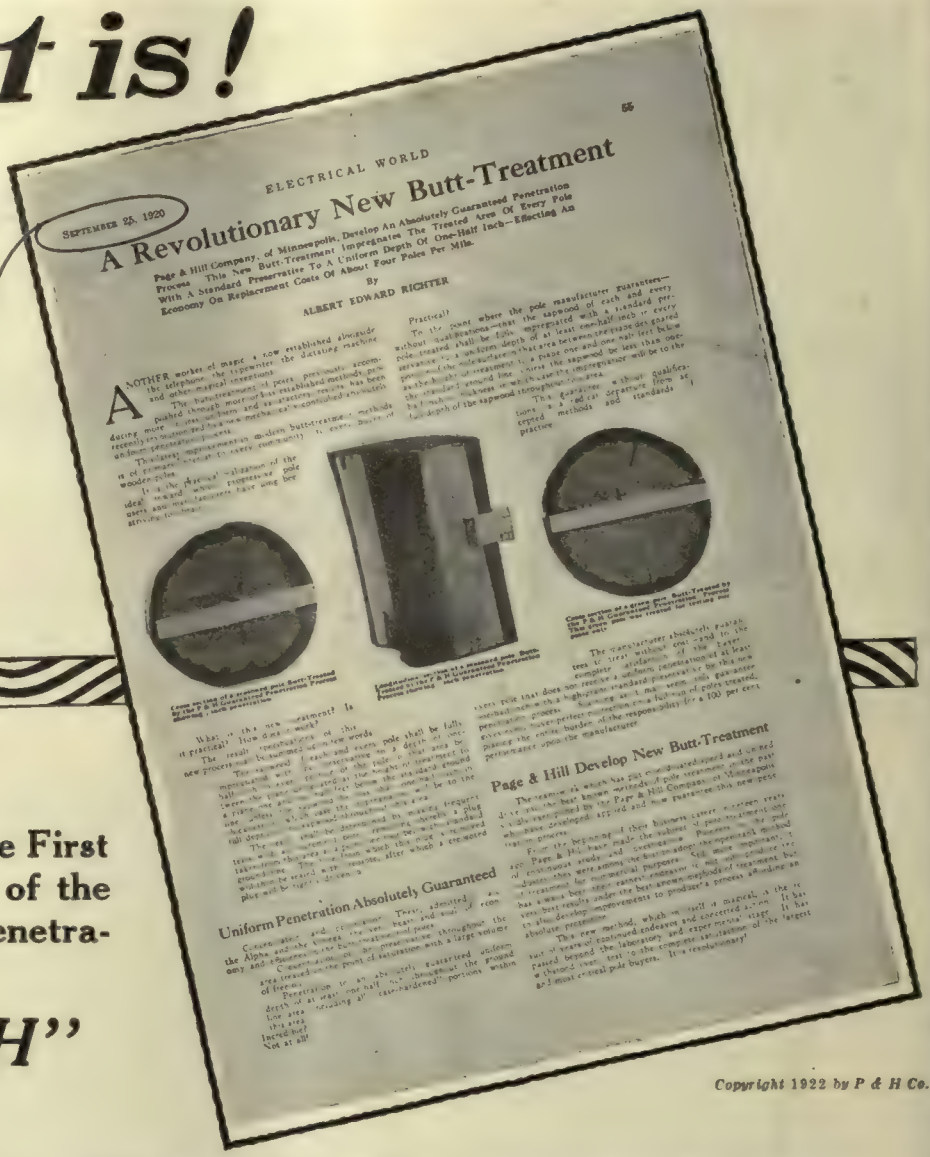
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Here it is!

Note the date of this article announcing the P & H Guaranteed Penetration process of butt-treating cedar poles - perfected by Page & Hill Co.

SEPTEMBER 25, 1920


ELECTRICAL WORLD

SEPTEMBER 25, 1920

A Revolutionary New Butt-Treatment

Page & Hill Company, of Minneapolis, Develop An Absolutely Guaranteed Penetration Process This New Butt-Treatment Impregnates The Treated Area Of Every Pole With A Standard Preservative To A Uniform Depth Of One-Half Inch—Effecting An Economy On Replacement Costs Of About Four Poles Per Mile.

By

ALBERT EDWARD RICHTER

ANOTHER worker of magic a now established alongside the telephone, the typewriter, the dictating machine and other magical inventions.

The butt-treatment of poles puts mystic, accomplished through more-or-less established methods, has been recently improved by a new mechanical process which is said to almost obliterate the possibility of decay.

The latest improvement in modern butt-treatment methods is of revolutionary importance (if correctly) to every owner of wooden poles.

It is the practical realization of the ideal—a standard preservative poles and manufacturers have long been striving for.

Why is this new treatment? In what does it work?

The result is best described in the words of the process-developers themselves as follows:

"The sapwood ... penetrated to a depth of one-half inch, or more, throughout the entire ground-line area of the pole. In order to accomplish this result, it is necessary to treat the pole with a preservative that will penetrate to a depth of at least one-half inch in the sapwood. The sapwood is the only part of the pole that will absorb the preservative. The heartwood will not absorb it. Therefore, the depth of penetration is determined by the thickness of

Only 5 men



—where 9 were used before!

Multiple Unit Door Control

makes train operation still more economical

QUITE a progressive step, it was, when they first began coupling cars in trains of two or more units, and thereby eliminating one man per car.

But Multiple Unit Door Control beats that! It concentrates door control at any point or points you wish, and eliminates even the necessity for one man on every car.

Take the New York Interborough Subway trains as a conspicuous example. By means of National Pneumatic Multiple Unit Door Control, they now have five platform men per 10-car train, instead of 9, without impairment of service, or conflict of any kind. Passengers caught in closing doors are never hurt, because at the slightest touch the motion is instantly and automatically reversed, and the door repeats the cycle automatically until it is entirely closed.

It's the biggest money saver in train operation you can find.



Let us show you more!

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control — Door and Step Operating Mechanisms
Motorman's Signal Lights — Safety Interlocking Door Control
Multiple Unit Door Control

50 Church Street, New York — **McCormick Bldg., Chicago**
Colonial Trust Bldg., Philadelphia
Works: Rahway, N. J.

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

SAFETY CAR PIONEERS



8 YEARS OF DEVELOPMENT

THE year 1915 witnessed the inception of the Safety Car. The first of the cars ever placed in service—on the properties of the Seattle Electric Co., the Everett (Wash.) Division of the Puget Sound International Railway and Power Co., and the Illinois Traction Co.—were equipped with our Air Brake and Safety Car Control Devices.

It was this equipment which made it possible to realize one of the fundamental objects of the car—the saving in man power and platform expense.

Throughout the past eight years we have devoted ourselves to Safety Car development. Naturally, it is a source of pride to us that we have shared responsibility for the marvelous growth of this new form of transportation, and that approximately 6,500 Safety Cars, made possible by our equipment, are now operating in 300 cities.

Let us show you how our equipment can be made to solve *your* problems. Applicable to new cars or old—any type.

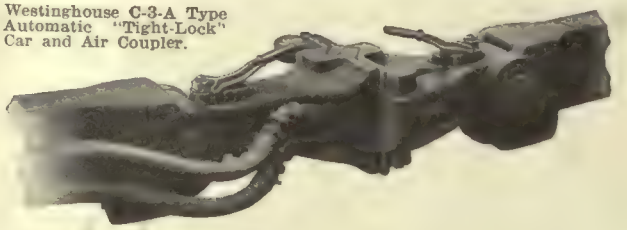


SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



Illustrated: A pair of Westinghouse C-3-A Type Automatic "Tight-Lock" Car and Air Couplers, still giving satisfactory service after nine years on cars of Cincinnati Traction Company.

Westinghouse C-3-A Type Automatic "Tight-Lock" Car and Air Coupler.



9 years in Service

WHAT a large number of traction companies have learned by experience about Westinghouse Automatic "Tight-Lock" Couplers, will be of value to you.

They have learned that efficiency, dependability and low cost of upkeep, over a period of many years, are traditional of all couplers bearing the stamp of Westinghouse.

We have an Automatic Coupler for every class of service—one type light enough that it is used on Safety Cars, a type for medium-weight cars and still another type for the heaviest subway, elevated and interurban trains.

Couplers to give car and air, or car, air and electric connections. All strictly "Tightlock."



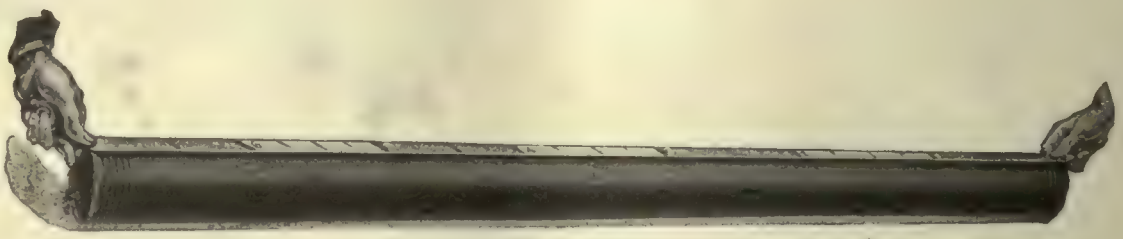
Westinghouse Traction Brake Company

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WESTINGHOUSE TRACTION BRAKES



Bermico Fibre Conduit Comes In SEVEN Foot Lengths

The seven-foot lengths make for economy.

The lengths are machine made. They come from the machines with wall thickness automatically gauged to the 1000th of an inch.

The Bermico Conduit so formed and always under technical control and inspection is next slowly dried and seasoned by elaborate machinery. The water is removed by methods that safeguard the homogeneity of the conduit and prevent defects from blistering, warping, etc.

In a word this automatic machinery turns out straight, tough, uniform, seven-foot tubes by the tens of thousands.

Furthermore, all these tubes are inspected and reinspected at each step in production. It follows that Bermico Fibre Conduit is maintained exactly up to the high standard the word Bermico has come to mean.

A NATIONAL ELECTRICAL SERVICE

Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES



Electric ARC Welded!

Lackawanna & Wyoming Valley R.R. Saves over $1100 and 3 Months Delay

A year ago a large crack developed in this high pressure gas engine cylinder. As this was a special cylinder, it could not be replaced within three months and would cost about $1200.00. Instead of getting a new cylinder the crack was welded with the small RWB Dynamotor (type BB). In a few days the cylinder was again in use and not only a direct saving of over $1100.00 was realized but a serious shutdown of three months was avoided. The cylinder has been in constant operation ever since it was welded. (Arrow points indicate welded area.)

This is a typical example of what electric welding can do for every electric railway property. Besides shop equipment repairs, it is essential in keeping the maintenance cost of rolling stock at a low figure. It offers opportunities to reclaim in a short time broken and worn parts which may mean days of delay before replacements can be obtained. In addition, track repairs and good bonding can be secured. For all these various classes of work the portable RWB Dynamotor (type BB) is employed by many railways. Hundreds of these machines are in use and savings amount to thousands of dollars yearly. With this machine the carbon arc can be used in addition to the ordinary metallic arc. This frequently doubles the speed with which certain classes of work can be done. Either positive or negative electrode is available, which allows the best welding method in this respect for each job. Power consumption is also low, which is an important factor to be considered. Sturdiness, portability and low upkeep costs are among other features of the Dynamotor which add to its value from an equipment standpoint.

Just how much can be saved by electric welding depends entirely on how thoroughly it is used. With the type BB Dynamotor ample means are available to make these savings by electric welding unusually large, for the machine is so well equipped for both track and shop work.

Rail Welding & Bonding Company

Cleveland, Ohio

Preferred—

because it restores a true surface to corrugated rail.



The Reciprocating Track Grinder

best suits the Connecticut Company

"What type of grinder, other than a reciprocating grinder, is best adapted for removing corrugations in rail?" was the question recently sent out by the American Electric Railway Association.

Out of many answers placing the Reciprocating Track Grinder ahead of all others, here's one from M. M. Johnston, Division Engineer of the Connecticut Company: "We have always used the Reciprocating Grinder for this purpose. A rotary grinder, similar to the Atlas or Universal, will do the work more rapidly when the corrugations are deep, but the results are not so satisfactory due to the difficulty in obtaining a true surface throughout any great length of rail."

The Reciprocating Grinder not only maintains a true even surface, but the grinding blocks actually restore the original shape of the rail head, instead of grinding it flat.



"Atlas" Rail Grinder

"ATLAS" and "UNIVERSAL"

best for other kinds of rail grinding

High-speed rotary grinders, especially adapted to following up welding operations, grinding off surplus metal, truing gage lines and making repairs to special work.

RAILWAY TRACK-WORK COMPANY

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Chas. N. Wood Co. Boston | Electrical Engineering & Mfg. Co. Pittsburgh | Atlas Railway Supply Co. Chicago | P. W. Wood New Orleans | Equipment & Engineering Co. London



EVIDENCE

Galena Electric Railway Lubricants have an enviable record of accomplishment. Their reputation for efficiency and economy has been earned in the open field of practical service. They have repeatedly demonstrated their ability in tests with other oils.

In every section of the country, Galena Oils are in daily use on the power house and rolling equipment of electric railroads—not merely on a few isolated properties, but on hundreds, including the largest and heaviest traffic carrying lines. Their records of performance in mileage, freedom from bearing troubles and in making possible better operating conditions, may be found in the reports of any road under Galena lubrication.

These reports are usually available to other roads and should furnish a reliable source of comparison to roads engaged in similar service. They may safely be accepted as real evidence that should far outweigh general assertions. We will gladly refer you to Galena lubricated equipment comparable with yours.

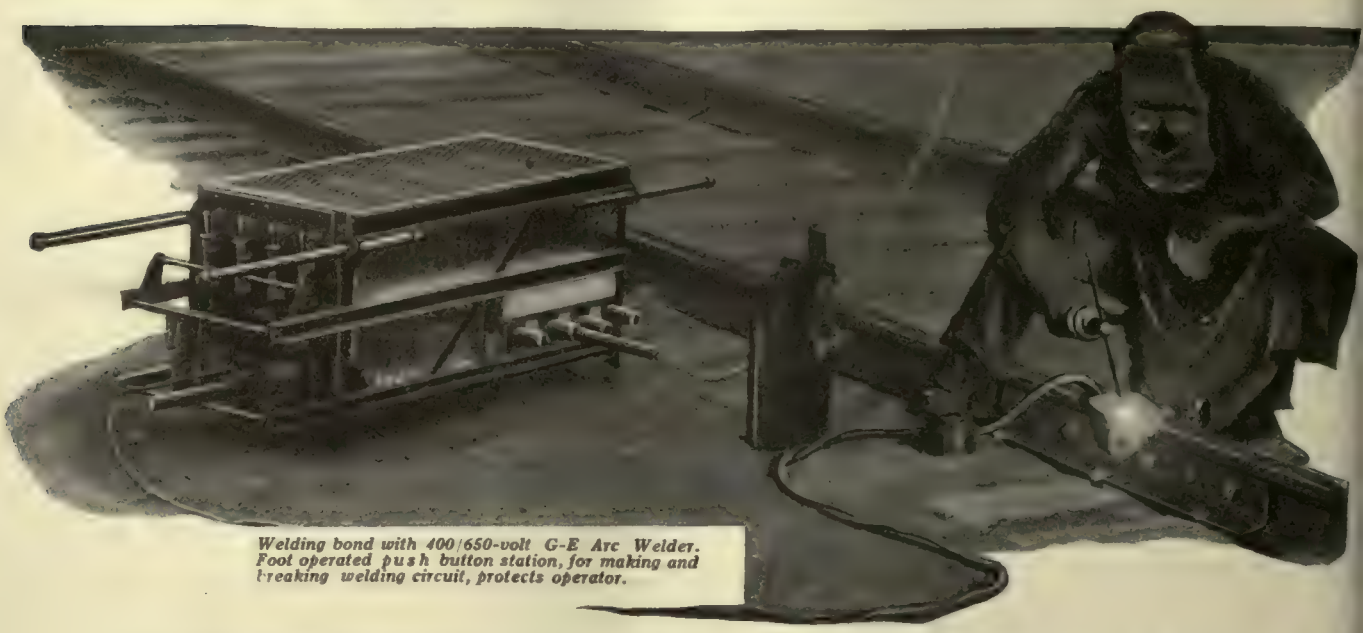
"Day by day — in every way
You'll find Galena Service pay!"

Galena-Signal Oil Company

New York - Franklin, Pa. Chicago

and offices in principal cities

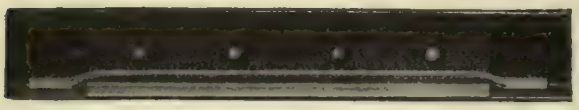
Good Bonding is fundamental to improved service at less cost. Invest in it.



Welding bond with 400/650-volt G-E Arc Welder. Foot operated push button station, for making and breaking welding circuit, protects operator.



Form SF-1, made single and double conductor, for attaching to rail head. Readily applied without tearing up pavement.



Form SF-4 bond with steel terminals to fit the angle between the web and base of the rail.



Form SF-6 for application around the joint plate. Designed to be attached to top of rail flange.

Use G-E Welded Bonds

Think of an unbonded joint as an open circuit—that's what it is, practically. The high resistance causes a voltage drop that you pay for in impaired service and increased cost of repairs to motors operating on abnormally high current. And there is an energy loss that's bound to show up in your power or coal bill.

To do without good bonding is to practice false economy. You might as well try to run machinery without lubrication.

Rails as long as the system and without a joint would be ideal. Impossible, of course. But with welded bonds the track, as an electrical circuit, *is without a joint.* Furthermore, welded bonds are more easily and cheaply applied.

Ask our nearest Sales Office about G-E rail bonds and G-E equipment to weld them.

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

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New York, Saturday, May 12, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61
Number 19

Toronto Reports a Surplus of $109,468 for Sixteen Months

A GREAT deal of interest will attach to the report, digested elsewhere in this issue, of the operation of the Toronto lines by the city for the sixteen months ended Dec. 31, 1922. The surplus shown is $109,468. On the basis of fixed assets of $34,586,698, the return on the investment approaches the infinitesimal. Judging from the report, which, however, gives very meager information and makes it impossible really to know what has been charged up to the railway or transferred to other city accounts in arriving at this net, the city has done one thing. It has apparently made the enterprise self-supporting. This is what it set out to do. The management there never fell for the fetish of the 5-cent fare. The average fare is 6.165 cents. Moreover, in discussing the fare question, H. H. Couzens, the manager of the Toronto Transportation Commission, explains that with a flat fare every extension to the system increases the cost of doing business without a corresponding increase in revenue.

The report is not intended to be a railway operating statement, but it is interesting in that the manager for the commission has made it quite plain that the operation of the system is in no way free from the hazards that attach to private management. Thus he calls particular attention to construction work carried out at the greatly increased prices for material and labor prevailing in the present market, charges that Toronto must meet in the future by increased car fares.

Plan Ahead to Cope with Growing Vehicular Traffic

LAST week an item appeared in this paper showing an increase of 17 per cent in motor vehicle registration for 1922 over the preceding year.

Dr. Wilfred I. King of the National Bureau of Economic Research, and author of the book "Income in the United States," is quoted as saying that he can see no immediate saturation point in this field. Dr. Wesley C. Mitchell of Columbia University, author of "Business Cycles," agrees in this and argues that with decreases in price and reduced cost of upkeep, we can double the number of cars in use. These and other authorities indicate that with the present population we can support some 20,000,000 passenger automobiles in the United States. In the case of trucks, the limit will be found on the basis of comparative costs as against other forms of transportation, but there is no indication of any reduction in the rate of expansion for some time.

Interurbans are very much interested in this growth in motor vehicle use from the standpoint of competition. The street railways have some interest in this direction, but they will probably be more concerned from the standpoint of the increased street congestion, which means slower schedules and more accidents. It all points to the need to plan ahead to give the best possible service with attractive cars and fast schedules, and to work toward traffic control measures that will keep the car routes open and free of such obstructions as come from promiscuous parking, cruising, left-hand turns, permitting heavy trucking and other vehicular movement to be concentrated on car line streets, etc.

The Public Can Do Much to Reduce Accident Hazard

WITH the growth of street traffic comes the accident, like Banquo's ghost, to haunt the railway man. Every forty minutes a motor vehicle kills some one on America's highways. In 1922 the number of persons killed in this way approached that of the list killed in action in the late war. William P. Eno, the international traffic authority, believes the records are far too small, as he says many of those who die ultimately from traffic accidents get home, out of town, or to a hospital, and all records of the cause of the death are often lost. He thinks it not unlikely that the number of deaths from highway traffic is 36,000 a year.

Some persons believe that this waste of life can be prevented by legislation. Undoubtedly much can be accomplished by good regulations, well enforced, but no laws can eliminate the reckless driver or the careless pedestrian. Education of the individual, which can be accomplished best through organized effort in a community, is the best way to reduce the hazard.

What part does the street railway play in this? For some time past the companies have conducted and organized safety campaigns among the employees, and the result has been that little more can be accomplished along this line in further reduction of accidents. Most of the street railway accidents nowadays are caused by persons having no connection with the company, and are entirely beyond its control. While the street railway accidents are but a small part of the total, the best way to reduce them is to appeal to the public at large. Prevention of the accident eliminates the liability for which the railway is the particular target.

The accident situation is not discouraging, however, as good results have been obtained from the safety agitation already done, if viewed in the number of accidents per hundred thousand car miles, or per hundred vehicles. But the greatly increasing vehicular movement practically compels the electric railway, in defense of its earnings, to carry propaganda for safety beyond its own employees to the community at large.

This week is published the first of a series of articles by C. W. Price, an authority on safety work, who has organized several successful campaigns, among them one in Washington, D. C. In this series he takes up the methods employed and shows how accidents actually have been reduced, in some cases the fatalities being 30 per cent less in 1922 than in the previous year, even though the total traffic increased. The articles will

discuss safety campaigns as planned and carried out by street car companies so that they should be especially helpful to railway executives in planning their future safety activities.

Home Rule Legislation Fails in New York

GOVERNOR SMITH'S program of utility legislation has failed. Desperate efforts were made by the Governor at the last moment to save something from the wreckage for the home-rule advocates, but the differences between the two factions in the New York Legislature proved irreconcilable. Mayor Hylan played the game of all or nothing, and in this case he got nothing. The result has been more idle vaporing from Hizzoner and a demand upon the Governor by the Board of Estimate of New York City for a special session of the Legislature to consider transit legislation.

The Governor, however, has said that he can see "no reason at present for such a session." Not content with that, the Board of Estimate has instructed the Corporation Counsel to prepare legal charges asking the Governor to remove members of the Transit Commission. The Mayor has scored the "four Republican obstructionists" in the Legislature and they in turn have lambasted the Mayor, who is accused by them of making "false appeals in order to keep alive a political issue which he and his associates have found profitable."

According to the Governor, himself a Democrat, the Democratic view of the legislation he advocated meant a comprehensive solution of the transit problem as a whole, while the Republican program at best promised something in 1928. This statement was, of course, intended for popular consumption, but the program of the Democrats in New York should be analyzed in the light of the facts in the case. First of all, they wanted a return to home rule, with a new commission for New York City responsible only to the Mayor and the Board of Estimate, the decisions of this commission not to be subject to review by the courts. In addition, they wanted, briefly, the right to own and operate new subways and eventually to own and operate all subways; the right to regulate the present privately operated subways, and the right to establish municipally owned and operated bus lines anywhere in the city without securing a certificate of convenience and necessity. The Republicans insisted that the state should be permitted to continue to regulate security issues; that the city should secure the necessary rights from a state commission before being permitted to place buses in operation in competition with existing means of transportation, and that after operation of any transit facilities for a reasonable length of time at a 5-cent fare the fare be increased, if necessary, to make the operation of such lines self-supporting. The Republicans were unalterably opposed to any deficits from operation being met from general taxation.

These are just a few of the irreconcilable differences between the two factions. They show, however, the extent of the assault that it was proposed to make upon the present existing order of things in an effort to satisfy the vanity of an administration that has construed its election to office to mean that it should be permitted to proceed without let or hindrance with a program of municipalization staggering in the possibilities of evil that might come out of it.

As matters now stand the present Transit Commission in New York is left with its powers intact to carry on to completion, if it can, the program for unification of the existing transportation lines and the construction of new rapid transit routes, while the Mayor is left to think things over and perfect the paper plans for the construction of the separate system of lines which the city administration has recently indicated it proposes to carry to completion under its existing powers. There remains, of course, the possibility that the Mayor and the commission may get together on the matter of future subway building, and some of the New York City papers have gone to laborious lengths to point out that the differences between the city administration and the commission are not irreconcilable.

Chamber of Commerce Makes Progress in Solving Transportation Problems

THE main subject announced for the annual meeting of the Chamber of Commerce of the United States in New York this week, namely, "Transportation in All Its Phases in the United States," is somewhat misleading because city transportation was not considered. The papers and discussions on transportation were on how the trunk line railroads could be rehabilitated so that they could better serve the public and how the operation of the motor truck and waterway could best be co-ordinated with the railroad in the country's transportation system. While electric railways, as freight carriers, were mentioned only indirectly, the meeting had many points of direct interest to them because many of their financing and labor problems are similar to those of the steam railroads; they also are faced with automotive competition, and they are vitally interested in regulation and in the coal question. Electric railway problems are also to be taken up as part of a study of the general transportation situation by a committee whose appointment was decided upon by the Chamber some time ago. Five sub-committees of this main committee made progress reports at the meeting and will consider, among other things, freight rates, cost of operation and taxation of motor and railway carriers, wear on highways by motor trucks, possibilities of co-ordination of the motor bus and electric railways, and other allied topics.

The most interesting feature of the discussion on transportation at the meeting was that in the addresses and debates two principles stood out as being generally accepted, not only by the membership in general but by the advocates of motor transport and water transport as well. The first of these is that the main transportation of the country will still have to be carried on rails and that government ownership of these rail carriers is undesirable. In consequence, such a policy must be adopted toward them as to encourage their development and expansion under private initiative. The second conclusion reached is that in the interests of both public and carriers there should be better co-ordination between the different modes of transit, so that each shall undertake only that part of the work for which it is better fitted than the others, and that this comparison should include a consideration of the cost of operation, of which a part is any subsidy which it may receive by having part of its right-of-way furnished free at government expense.

Altogether the meeting was a step forward in the correct solution of transportation problems, as well as in the other questions considered, and much may be expected from the reports of the five committees now working under the direction of the Chamber studying various phases of the transportation problem.



Inspection Bay No. 2 in Carhouse Just Constructed at Toronto

Toronto's New Car Storage Facilities

Rehabilitation Program Includes Expansion and Improvement of Division Inspection and Storage—One Layout Has Just Been Completed—A Feature Is the Provision for Fire Protection—Reinforced Concrete Selected on Competitive Annual Cost Basis

THE rehabilitation program of the Toronto Street Railway system, under the direction of the Toronto Transportation Commission, includes the erection of several new carhouses. One of these, with division headquarters and employees' rooms, has recently been completed at the corner of Eglington Avenue and Yonge Street, and plans have been prepared for a similar building to be known as the Danforth carhouse.

The Eglington carhouse, or inspection shop as it might more properly be called, occupies part of a plot of 10.32 acres which was purchased by the commission. The arrangement of the carhouse and yards, however, is such that a portion of this plot of about 3.05 acres is available for resale for stores and residences. The space occupied by the main carhouse is 41,695 sq.ft. and that by the office building is 5,450 sq.ft. The rest of the space used for railway purposes is given up principally to storage tracks, as in Toronto open storage is used for most of the cars.

The storage capacity of the carhouse proper is thirty-four cars, based on a 50-ft. length. The yards at present will hold 120 cars, but this can be increased by additional tracks to hold fifty-three more cars when desired, thus providing a total capacity of 207 cars at this place. The entrances to the yards and to the carhouse are paved with granite blocks and the remainder of the yard is ballasted with cinders.

The main entrance to the yard is from Eglington Avenue and the general movement of the cars is south to the Yonge Street exit. Toronto service is given largely by single-end cars, with trailers in rush hours, and the yard is adapted to that kind of operation. Two electric shunters are used to move the trailers around.

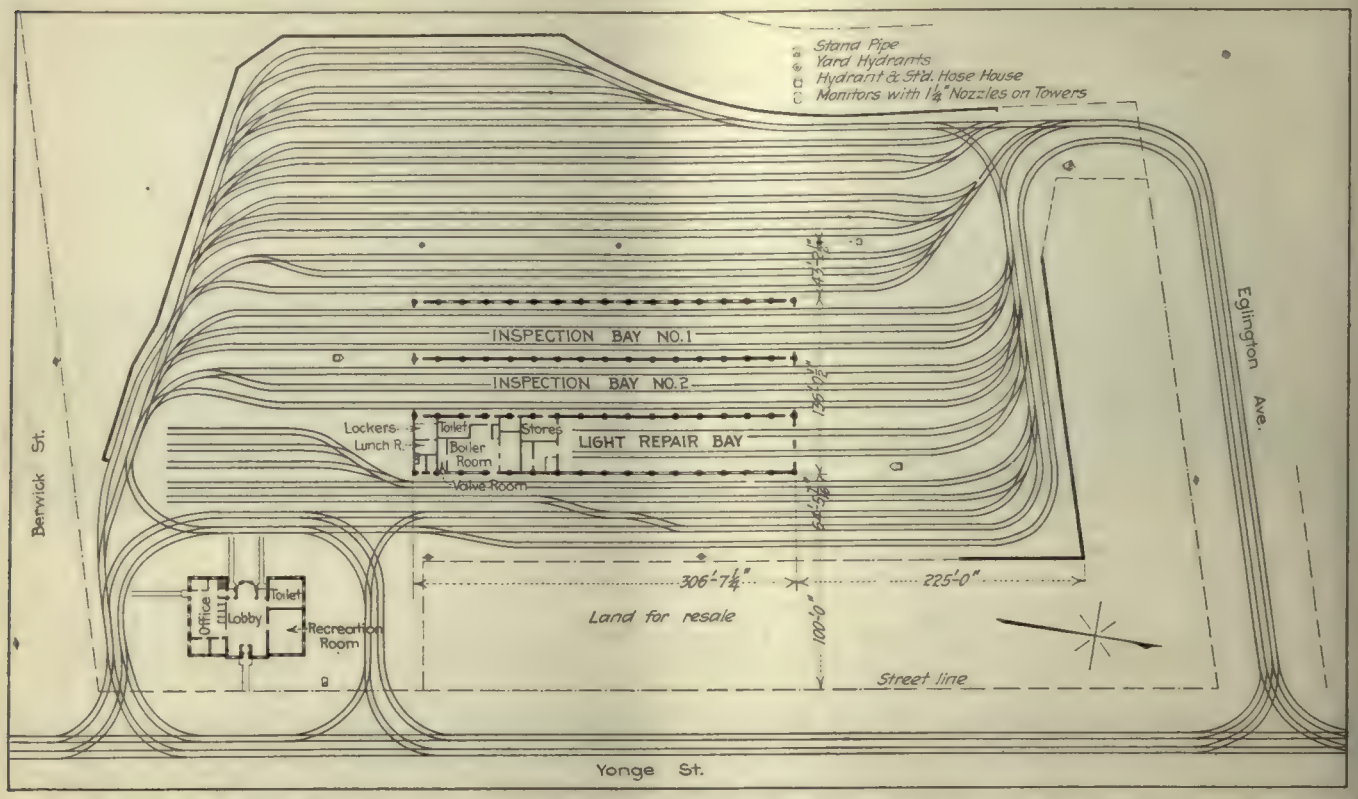


The Division Headquarters Building Has a Pleasing Exterior

Carhouse and Storage Yards

The carhouse proper is a reinforced-concrete structure with brick and tile walls, steel sash and electrically operated rolling steel doors. It has no wood in its construction and is equipped throughout with automatic sprinklers and an auxiliary fire hose system. It is divided into three bays by fire walls, each bay being 307 ft. long by 44 ft. wide. The two westerly bays are used for the inspection of cars. Each has three tracks and is closed by doors at either end. The remaining bay, with two tracks, accommodates the workshop, storerooms, boiler house, lavatories and locker room. Under every track is a concrete inspection pit running the full length of the building.

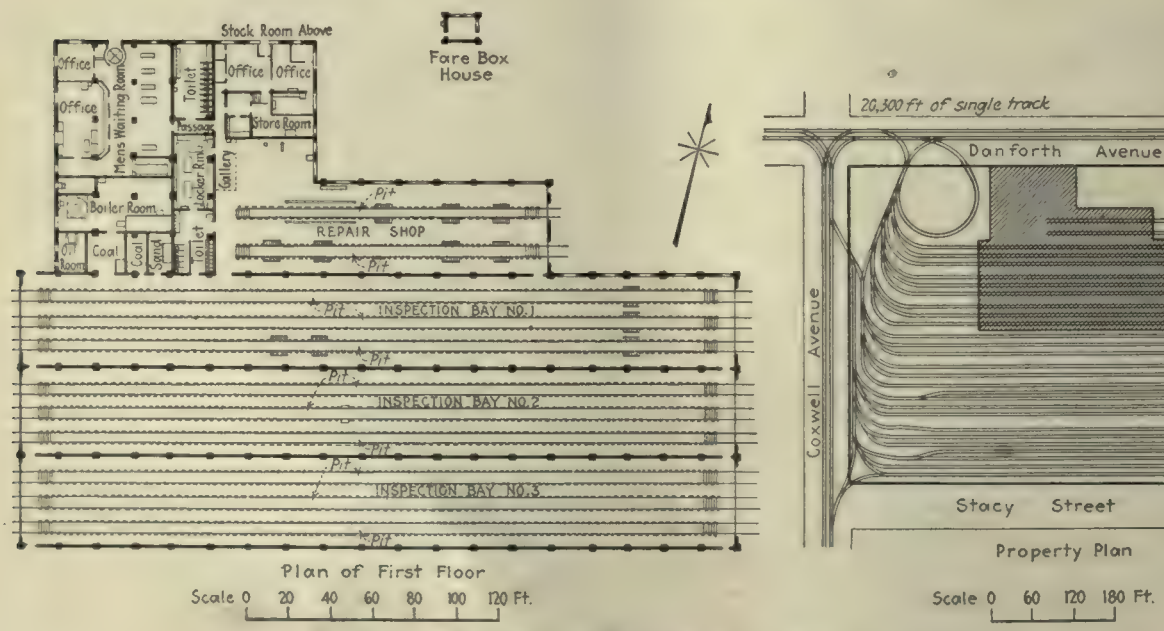
In addition to the sprinkler system and auxiliary fire-hose system in the carhouse, a number of monitor nozzles are located on the roofs, while others are on poles. These nozzles are capable of playing water over the site used for storing the cars. There also are yard hydrants and standpipes, the locations of which are shown on the accompanying plan. This special fire protection not only insures very low insurance rates, and so justifies itself on this ground, but it provides as far as possible against se-



Plan of Eglington Carhouse and Storage Yards Shows Minimum Use of Street Frontage



The Main Room in Division Headquarters Is Well Lighted and Cheerful



Plans of Danforth Carhouse and Yards Under Construction

rious disorganization of the service if a fire destroyed rolling stock which the company could not replace for months.

Within the carhouse the spraying system of car washing is employed. It is similar to that used by the Detroit Municipal Railway and described on page 705 of the ELECTRIC RAILWAY JOURNAL for Oct. 28, 1922. On both of these railways cars are washed as they pass through the carhouse.

The building is heated by hot air, driven by fans through concrete and tile ducts to outlets in the pit floors.

OFFICE BUILDING

The office building, located at the southeast corner of the site, is a brick structure with steel frame, 92 ft. long by 60 ft. wide, and provides accommodation for the men and staff of the division which operates from this depot. In the center of the building is a well-lighted lobby with large windows at both ends. It contains schedule racks, order boards, tables where the men can make out their reports, with ticket and cashiers' windows at the left. The general interior view of the waiting room shows this side of the lobby, with the railings, which are of aluminum piping. Opening to the right are the trainmen's recreation room and lavatories.

COST OF CONSTRUCTION

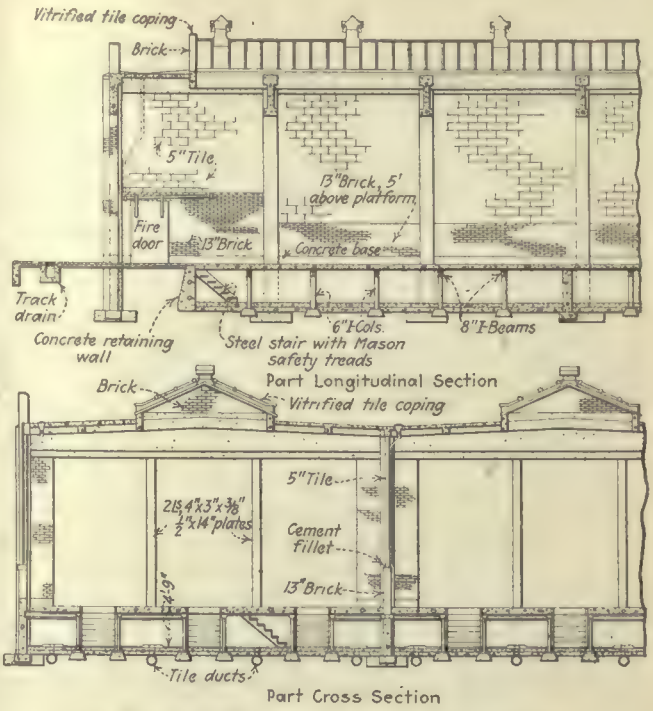
The total cost of the carhouse and office building, including furnishings and equipment, but exclusive of land, was about $275,000. Before adopting this construction the Transportation Commission made an analysis of different types, with the results shown in the accompanying table. Reinforced concrete, the type adopted, was most expensive in first cost, but the reduction in insurance premiums on buildings and contents and the lowered maintenance of buildings brought the total annual operating costs of the three types of construction to almost the same. Hence the great advantage to the system of having a practically fireproof construction at the same time was secured without extra cost.

COSTS OF DIFFERENT TYPES OF CONSTRUCTION FOR CARHOUSE TO ACCOMMODATE THIRTY-FOUR CARS

(Including sprinklers and track in buildings)

Type of Construction	Reinforced Concrete (Columns and Roof)	Steel Trusses, Steel Columns, Gypsum Roof	Steel Trusses, Steel Columns, Wood Roof
Capital cost	$215,000	$213,000	$207,000
Annual charges:			
Interest and sinking fund at 9 per cent	19,350	19,170	18,630
Insurance premiums on buildings and contents, and maintenance	2,828	3,077	3,542
Total	$22,178	$22,247	$22,172
Costs per car:			
Capital	$1,194	$1,183	$1,150
Annual operating	123.21	123.59	123.17
Costs per cu.ft.			
Building, shell only (cents)	19.1	18.9	18.4
Building, equipped (cents)	19.7	19.5	19.0

In addition to the Eglington carhouse, which has been completed, the Toronto Transportation Commission is building a somewhat similar structure with accompanying storage yard occupying an entire block at the corner of Danforth Avenue and Coxwell Avenue. With the yards the capacity is 263 cars, there being twenty-six storage tracks, of which nine pass through the three inclosed inspection bays. Two additional tracks enter the repair shop. A plan is given in the lower diagram on page 792.



Use of Reinforced Concrete Secures Fire Protection

Broadcasting Utility Information in the Middle West

THE Iowa Committee on Public Utility Information has adopted a novel method of interesting the public in the work of assisting in solving problems which the public must face if adequate utility service is to be furnished. The director of the committee, Joe Carmichael, gave a fourteen-minute talk on the evening of April 30 from Radiophone Station WOC, Palmer School of Chiropractic, Davenport, Iowa.

"WOC" is one of the strongest broadcasting stations in the country, and telegrams, phone calls and letters indicated that the talk was heard in distant parts of the country. Thousands of people listened in in the immediate vicinity of Davenport.

The speaker discussed briefly some of the difficulties confronting the electric light, gas and electric railway industries. He pointed out that the public was confronting the utilities with the biggest economic task that any industry ever faced. In order to provide service which the public was demanding, the utilities had to double their investment in the next six or seven years. That investment now exceeds thirteen billions of dollars. It has been accumulating for half a century, yet it now must be duplicated in a few years.

The utilities, he said, did not know where the money was coming from, but they knew where it was not coming from. It was not coming from dissatisfied, disgruntled customers. It was not coming from anywhere, if there was any appreciable number of disgruntled, dissatisfied customers, for no one was going to invest money in an industry whose public relations were bad.

Exchanging Ideas on Publicity Work

The Publicity Men of Several Mid-West States Are Exchanging Views and Presenting Discussions on Various Aspects of Their Work Through the Medium of a Bulletin—Some of the Matter Presented Therein Is Abstracted Here

By E. B. Sanders
Publicity Manager Kansas City Railways

PUBLICITY is either good or bad, beneficial or injurious; it molds public opinion either favorably or adversely; it can "make or break you."

With the right kind of publicity an ordinary actor becomes a star overnight; print a few words of commendation on the successful manner in which some lawyer has handled a case and clients will flock to him for counsel; boost a street railway and you have won public sentiment to the side of the company.

As a general rule newspaper editors are more inclined to boost than to criticise. Any individual who is constantly striving to do the right thing usually receives the support of the newspaper; and the same principle applies to any industry. The electric railway industry needs plenty of publicity—the right kind of publicity. But we can't get it unless we go after it in the right way.

In the first place there must be something done to create good publicity. It's the lack of effort that usually results in the wrong kind of publicity.

The fact that service is the one and only commodity the electric railways have to offer necessarily implies that our efforts to secure publicity must be concentrated on that one sales article.

Keep Up the Supply of News

Fortunately, however, service covers a lot of territory. It may be divided into many classes—and each class is deserving of the proper publicity. The idea is to keep showering the newspapers with news. If we don't furnish the material, how can we expect to be fairly treated?

King "Tut" had to wait a long time to break into print, and then didn't profit by it. The street railway man can't wait that long. He has to advertise while there is still time to reap a reward, for three thousand years from now when some "Americanologist" unearths one of our twentieth century cars, places it in a museum, and the people pass by and remark, "What an odd looking chariot," it won't make much difference to us what the newspapers say about us or our "chariots."

But today—that's a different story.

In the publicity game today we are either King Tuts or King Solomons. The latter was a good advertiser—he got his while the getting was good. That's what the street railway men in the Middle West are trying to do.

Last summer the more than fifty companies in five Middle Western states (Missouri, Kansas, Iowa, Nebraska and Oklahoma) "pooled" their publicity and advertising ideas. In other words, these companies agreed to exchange advertising copy of all kinds as well as suggestions and ideas along that line. As a medium of such exchange a *Bulletin* was started and sent to every company in this territory. Published every other month, this *Bulletin* contains articles on subjects of interest to the electric railway publicity men, advertising copy used by the various companies, ideas and suggestions on how to secure publicity, what and how to advertise, and other valuable information Everything appearing in the *Bulletin* is prepared by the men who handle the publicity for their companies. This "pooling" of ideas and suggestions has proved invaluable to the men in this territory.

Before the first issue of the *Bulletin* appeared, the following questionnaire was sent out to every company in these five states:

1. Do you use any of the following advertising channels? (a) Newspaper space. (b) Window signs. (c) Company publications. (d) Dash cards. (e) Cards inside cars. (f) Handbills. (g) Other mediums.
2. Do you receive much newspaper space in the way of news items?
3. Are your newspapers friendly to your company?
4. How many daily newspapers in your city?
5. Do you call the newspapers whenever you have any news that would be of interest to the public?
6. Have your receipts increased or decreased within the past year?
7. To what do you attribute such increase or decrease?
8. Have you any jitney competition? If so, approximately how many jitneys?
9. How many employees have you?
10. Would you be willing to write a short article for our bulletin on some phase of advertising or publicity work?
11. Will you please offer us some suggestions on ways and means of making the bulletin a popular and beneficial publication (these suggestions to be published in the bulletin)?

Practically every company filled out this questionnaire immediately, and the answers were published in the first *Bulletin* so that every company would know what the others were doing.

This investigation brought out the fact that very few companies were doing advertising of any kind; a few were receiving some free publicity—mostly news concerning accidents for which the company was not responsible, or pertaining to breakdowns in service.

Every company was 100 per cent strong for the *Bulletin*. All agreed to co-operate in every way to make this innovation a success. *And they have done so!* To day every *Bulletin* reader will tell you that he has been benefited by the ideas of others as expressed in each issue. More companies are advertising now than previously—and with splendid results.

Since the inauguration of the *Bulletin* several companies have begun publishing weekly pamphlets for distribution on their cars. This was one of the first suggestions made by one of the *Bulletin* readers. Other suggestions offered in the way of advertising mediums were as follows: Newspaper space; company publications; inside cards; dash cards; window signs; handbills; large signs on construction work detailing cost and number and quantity of materials used; moving picture films; and addresses by officials at club and civic organization meetings.

It might be said that today every company in this territory is using effectively one or more of these advertising mediums. One company official suggested that arrangements be made with radio broadcasting stations in this territory to broadcast occasional short speeches on the electric railway situation. And this was so good that plans are now under way to do this.

Speaking of publicity and public relations, an Oklahoma official said in *Bulletin* No. 3:

Public relations are in a large measure, whether good or bad, established by the employees of the utilities. Therefore, it would appear of the utmost importance to sell the service to employees first. Adequate, reliable service and conscientious employees who are good salesmen are the two important factors which establish and maintain public relations.

Advertising Pays Well

In *Bulletin* No. 4 appeared a number of splendid articles on "The Value of Good Newspaper Publicity." Here is an abstract of one by an official in Oklahoma:

Whatever the merits of such advertisings are, it must be borne in mind that the results can only be estimated, and to undertake to state a value in dollars and cents would indeed be difficult.

Advertising managers and others who are closely associated with advertising work, due to their extensive study of the values of the various methods of advertising, almost unanimously agree that newspaper advertising has a psychological value, which is difficult if not utterly impossible even to estimate. In this connection, my experience with newspaper advertising, from a public utility point of view, convinced me that the values of such advertising come from two directions, stimulating traffic and molding public sentiment. Whether either or both are worth what they cost is a matter of speculation. Personally, I believe they are. I am firmly convinced that public opinion, however unfavorable, can be changed to more favorable and probably made satisfactory by constant agitation in the proper way, through the columns of the newspapers, and this is indeed too important to be overlooked. Yet the most brilliant manager would demur if asked to place a dollar and cents value on it.

Advertising is like adjusting an important claim; one cannot say whether the investment was good or bad. It is largely a matter of opinion, and what appears to have been profitable could easily have been expensive without our having positive knowledge to the contrary.

Each utility has its own difficulties to overcome, many of which are characteristic to that community only. With a small property, such as ours, located in a sparingly populated district, the people soon familiarize themselves with the schedule, rates, etc., rendering the advertising of such useless, or practically so. Therefore, in such communities, and the same is true to some extent with larger properties, newspaper advertising must be designed to build up and maintain good public relations.

The newspapers, without a doubt, could be, if they are not, the most powerful agency in making public opinion either favorable or unfavorable to a local utility. Therefore, it would appear of considerable importance that our relations with the newspapers should be very favorable.

Utilities advertising is quite different from the ordinary advertising, in that they have but one article to sell, "Service." Everybody knows what a street car ride is, as well as what it means to have gas, telephone or electric service, and unless there is something special in the matter of rates or change of schedules, it requires an artist to write an advertisement that will attract attention enough to be generally read. Of course, at certain seasons of the year amusement parks offer a good field for newspaper advertisement, and where there is jitney or bus competition, much can be done through newspaper advertising to influence traffic in favor of the railway.

In conclusion, I want to say that personally I attach much importance to newspaper advertising. I believe that most utilities could expect to find it profitable to spend from ½ to 1 per cent of their gross receipts for carefully designed newspaper advertising.

Favorable Publicity Brings Patronage

A street railway official out in Kansas contributed this article on the subject:

A street car system cannot put an itemized valuation on good newspaper publicity. It is like the "going value" of any business, intangible, nevertheless an asset worth hundreds of dollars in real cash. Good newspaper publicity, which always means favorable publicity, brings this company car fares daily, many of them. How much of a day's revenue can be credited to friendly publicity can never be reckoned nor even approximated. Yet it is indisputable that favorable publicity brings patronage; unfavorable publicity would drive it away.

We know of scores of specific instances. Here is one of the outstanding examples:

A certain business man in our town lives near the end of a line, the principal source of revenue to our system. This man drives to and from work every day. His direct route would be on this car line to the business section. He always turns off at the paved cross street nearest his home, drives a block and turns on an avenue paralleling this line, to run downtown. In short, he turns two blocks out of his way daily.

Why? Let him explain, as he explained to a patron of our lines whom he happened to pick up one day:

"I always turn off of Santa Fé at that corner—maybe you've noticed it." he said. "Two blocks out of my way. Just because I don't like to pass up acquaintances waiting for a street car, and at the same time I don't like to take those nickels away from the street car company. I know the company needs them. Oh, if some one has missed his car and will have to wait or walk, or if it's bad weather, I always pick up as many as my old bus will hold. But the company can't get along without its fares, and those fellows can get along without a ride downtown in my hack; I just don't like to pick up passengers when the street car is right behind me. But if I pass up my friends, they begin to wonder what kind of a swell head I'm getting. That's why I always run downtown on this side street."

That man is a real friend of our company. He does not owe or own a cent in it. Nor did I, personally, know who he was until the street car patron told me about the incident. Then why his friendship for the company? Good newspaper publicity explains it, and nothing else does, in my opinion.

Regarding the value of good newspaper publicity as proved, the next question is how to get it. With both newspapers friendly, that is not difficult here. We do not impose on them by asking them to "say something nice" about us. Nothing would turn them against us sooner, and justly so, than constant begging for boosts. We get our favorable publicity by creating news.

We make news by making improvements in service whenever possible and by trying out ideas for the public's convenience. To be printed, it must reach the reporters. We consider it a part of our business to keep acquainted with the reporters. To get news about the company's plans or activities published, we need only to tell the reporters. They are anxious to get it. But it must be real news, not propaganda or "bunk," as they term it. For instance, we recently received considerable publicity on trying out a bus line as a substitute for one of our main lines; also for some track improvements we made. Meanwhile we had a line break down one night. Many faults could have been dug up about that. Instead the newspaper told about our efforts to restore service.

Another important reason for the friendly attitude of the press can be best expressed by the reporter who once gave me one of my most valuable publicity hints. He spoke inelegantly but eloquently. He said:

"I don't mind handing you guys a little boost once in a while, because you never try to cover up on accidents and such stuff; you give us all the dope you got on 'em. In other cities where I worked the street car companies were always hushing up stuff like that, and they'd lie and do anything to keep us reporters off anything they didn't want in the newspapers. Their motormen and conductors never told us anything because they knew they'd be fired or catch hell if they did. The bosses always made it as hard for us as they could to learn the facts about smashups and running over kids and such. You bet your life we never went out of our way trying to write anything good about them."

The value of good newspaper publicity to this company, and to any small-city line, is as much, almost, as the value of the franchise and investment. In a bigger city, where a large portion of the public must depend on traction service because the distances are greater, good newspaper publicity is not necessary to existence. However, good or bad publicity represents the difference between getting or losing the fares of the fellows who would rather walk or ride in a jitney than

pay a fare to that "grafting corporation." The total of those fares in a year can easily make the difference between a dividend and a loss.

KIND OF COPY IS IMPORTANT

Here is what another Kansas official says:

About two years ago we changed the plan of our newspaper advertising here in this city and made a cut of approximately one-third in the space carried, adopting for the advertisements a conversational form between two supposed car patrons, using a cut showing a business man and a laboring man on a car. In each ad at least one thought was conveyed, such as the company's yearly payroll, the amount of taxes paid annually, the number of families supported by the company, the amount of material and supplies purchased annually, and other such items, these subjects being interspersed with advertisements pointing to the high grade of service being rendered. Fine results were obtained within four months after the starting of this campaign, and the attitude of the public was changed from condemnation to boosting for us.

It has also been my experience that newspapers are very ready to publish what are commonly termed "human interest stories" in regard to politeness and efficiency of car operators, and incidents of a somewhat unusual nature occurring in the operation of cars. They are always very ready to publish news stories regarding new installation of equipment, track special work, etc. I believe that all publicity of this nature it is possible to secure is of great advantage in maintaining a friendly feeling between the street railroad and its patrons.

The superintendent of an interurban company, illustrating a point in his article, told the following story:

A Jew was in business and his turnover so slow that he was rapidly losing money. Business was indeed rotten. One day as he stood in the door looking for prospective customers, a minister of the gospel came by and noticed the disheartened look on the Jew's face. He stopped to give him a word of encouragement and asked him about his business. The Jew told all of his troubles and the minister said to him: "Well, Isaac, the trouble with you is that you do not pray enough to your God. Pray to Him reverently and fervently, and have faith in prayer, and it will be answered." The Jew promised the minister that he would do this.

Some days later the minister was passing the store again and noticing the disheartened look still on the storekeeper's face, stopped and asked if business had improved. "No," the Jew replied, "it is no better, and I have been praying to God and praying and praying, and my prayers have not been answered." "How have you been praying, and what have you been asking for?" kindly asked the minister. "Well," replied the Jew, "every day I have gone into my closet and prayed to God for the eight thousand dollars profit I have told Him that I need right away, and have repeated this prayer several times a day, but still it has not been answered." "That isn't the way to pray," suggested the minister. "You have been asking too much." To which the Jew replied, "Well, how did I know that was too much? Why didn't He make me an offer?"

In explaining his point, this superintendent said:

We, too, have been working for business and praying for an increase in earnings; but like the second-hand dealer, we have not been telling the people properly what we offer. We, too, have seemed to be waiting for an offer.

There were a number of other interesting articles in *Bulletin* No. 4 on "The Value of Good Newspaper Publicity."

This plan of "pooling" ideas has indeed proved profitable for the publicity men in these five Middle West states. Certainly there are no King Tuts "out where the West begins." King Solomon had nothing on them.

The Pennsylvania Water & Power Company has installed and tested a carrier-current or "wired-wireless" telephone outfit on its lines. It has been so successful that similar facilities are contemplated by the company between the generating station and the Lancaster (Pa.) substation.

Large Power Station Project in Detroit

THE vote on April 2 in Detroit in favor of the $12,000,000 bond issue for a municipal power plant is another step in the erection of this station to supply the needs for energy of the municipal undertakings. It will be recalled that an initial appropriation of $1,000,000 was made last June. This the Public Lighting Commission has been using for developing the site, for substructures and for engineering. The present appropriation of $12,000,000 is required to complete the work, $7,000,000 being for the power plant and $5,000,000 for the transmission system. Until the present debt limit of 2 per cent for public utilities in the city charter is increased, however, bonds cannot be sold for its erection.

The proposed new city station would be built at the foot of Morrell Street with a capacity of 120,000 kw. and would be equipped to burn powdered fuel. Its first equipment would consist of four 20,000-kw. turbines and it is estimated that it could furnish energy under the present load factor for 1.12 cents per kilowatt-hour, including interest and amortization charges on a twenty-two-year sinking fund basis.

At present, the city has a small municipal lighting station, and the railway department inherited two old power stations from the Detroit United Railway.

During recent years, while the Detroit United Railway was operating the city system in Detroit, it generated about one-third of its power and purchased about two-thirds from the Detroit Edison Company under a ten-year contract. This contract, which was entered into in July, 1913, provided that at the end of ten years either party could serve notice on the other that it was not ready to renew the contract, but in that case the contract would not terminate abruptly. Instead, the terms in regard to rates, power to be supplied, etc., would continue for a year. At the end of that time one-third of the load would be taken over by the purchaser; at the end of the second year two-thirds of the load would be taken over, and only at the end of the third year would all of the load be discontinued by the Edison company.

In the meantime, the Department of Street Railways has made an interim contract with the Detroit Edison Company for energy at substation d.c. bus bars. The rates under the contract for energy are on a sliding scale and include a coal clause, but it is estimated that the charges will be approximately as follows:

July 1, 1922, to July 1, 1923	1.006 cents per kw.-hr.
July 1, 1923, to July 1, 1924	1.243 cents per kw.-hr.
July 1, 1924, to July 1, 1925	1.482 cents per kw.-hr.
July 1, 1925, to July 1, 1926	1.750 cents per kw.-hr.

Under two supplementary contracts the Detroit Edison Company will also install in its substations 8,500 kw. of motor-generator sets which will be taken over by the city at the end of the contract. To care for its requirements in a section near the River Rouge, where the Edison company's substation isn't large enough to permit of additional equipment, the Department of Street Railways is installing a 2,000-kw. substation. The electrical equipment for this substation, which will consist of two motor-generator sets, has already been purchased from the Indiana Service Corporation. The Edison company's substation capacity will be increased by about 2,500 kw. by September and by about 6,000 kw. more when the new motor-generator sets already mentioned have been installed by the Edison Company.

Revamping the Filing and Record System of an Engineering Department

This Work Was Done in Order to Enable the Clerical Division of the Montreal Tramways Engineering Department to Handle a Largely Augmented Volume of Work with Speed and Accuracy

By R. B. Genest
Chief Clerk Engineering Department, Montreal Tramways



Head Timekeeper's Office Is Arranged to Facilitate Record Making

IN THE May 5, 1923, issue of the ELECTRIC RAILWAY JOURNAL the author explained how the cost accounting system of the Montreal Tramways was revised. There were several other improvements made in the filing and record system at the same time. In fact, these formed an integral part of the general rehabilitation of the accounting system.

THE ENGINEERING DEPARTMENT FILING SYSTEM WAS TACKLED FIRST

It was found, first of all, that our filing system was daily losing its effectiveness due to the worn condition of the file folders and the lack of space for the continually increasing number of files. The file system inaugurated fifteen years ago was, in other words, gradually falling down. Preliminary to a revision of the filing system, a representative of the engineering department attended a filing school, where he learned of the modern successful methods of handling correspondence. As a result, an economical system of filing which is adaptable to engineering work was devised.

The study which was made of methods of filing showed that the correspondence of an electric railway engineering department is difficult to classify. No hard and fast rules can be laid down which would be generally applicable. It is, however, not possible in general to index by the names of letter writers. In our case a simple index was devised containing the following headings:

A
3 ..... Accidents
6 ..... Agreements (extra copies)
35 ..... Automobiles

B
52 .....Bath-St. Denis Yard
73 ..... Bills
84 .....Blue Prints and Plans (Correspondence)
87 .....Boilers, General
88 .....Bolts, Track
90 .....Bonding
90 ..... Bonding cars
104 .....Bridges
119 .....Bureau of Standards, Washington

C
126 ..... Cable
131 .....C.P.R.-Longue Points Spur
137 .....Car Barns-Cote, Hochelaga, St. Denis, St. Henry, Terminal .....
137-A .....Car Hoists
137-B .....Car Stop Fasteners
137-C .....Car Stops
137-D .....Car Operating (Timekeepers)
141 .....Cattleguards
142 .....Cement
151 .....Cinders
152 .....Claims
161 .....Coal
170 .....Concrete Mixers
170-A .....Conduits
173 .....Construction Cars
185 .....Crane Cars
189 .....Crossings (railroad-diamond)
189-A .....Crossings (open)
189-B .....Crossings (underground)

D
213 .....Depots Cote, Hochelaga, St. Denis, St. Henry
213-A .....Derailments
215 .....Devilstrip (width of)
228-A .....Drainage
230 .....Drills, Track
232 .....Dumps

E
247 .....Electrolysis
247-A ...Electrical Commission of Montreal
247-B..Electric Railway Journal
247-C .....Electrification South Bank Branch CPR
247-D .....Elevators
251 .....Employees
252 ....Engineering Department Orders
259 .....Excavations
259-A .....Expenditure, Maintenance and Renewals; Expenditure, Maintenance and Renewals; Expenditure, Maintenance and Renewals; Expenditure, Maintenance and Renewals

F

262 .....Farm Tile Pipe
262-A .....Farm Ditches
266....Fences and Cattleguards
271 .....First Aid
271 .....Fires
282 .....Forms
282-A .....Form Letters
287.Franchises and Ordinances, Miscellaneous
289 .....Freight Shed
296 ....Filing System

G

301.....Garage, Cote Street
303.....Gages, Track
305....Genest, R. B. (Personal)
324...Grades, Grade Separation
326 .....Granite Blocks

H

340.....Hack Saw Blades
364 .....Hayes Derails
366 .....Head Office
414..Hydro-Electric Commission

I

418 .....Intersection
418-A .....Interlocking Plants
418-B .....Insurances
418-C .....Instructions

J

424 .....Jacks
433 .....Joints
433 .....Joints (Removable Paving Blocks for)

K

459.....Kinnear Doors, General

L

483 .....Lanterns
501.....Lighting, General
509 .....Locks
513 .....,.Loop, Nolan Street
518 .....Lumber

M

539...Machinery, Miscellaneous
545 .....Manholes
546 .....Manufacturing Orders
547 .....Maps
556 .....Material
564 .....Memoranda
569.....Meteorological Service
574 .....Mileages
583 .....Miscellaneous
587.....Montreal Tramways Commission

N

629.....Nova Scotia Tram & Power Co.

O

642 .....Organization
644....Ottawa Electric Railway

P

656 .....Paving
663 ....Permits
669 .....Photographs
670 .....Picks
677 ...Poles, Light Standards
679 .. ..Postal Rates
681 .....Power Plants, Cote, Hochelaga, St. Denis, St. Henry, Pte-aux-Trembles, St. Laurent, William Street, Youville
681..Power Distribution System
688 .....Programme
688-A .....Property, M. T. Co.
688-B....Proposed Construction
690 .....Publications

Q

692.....Q. P. U. Commission

R

693 .....Rails
693-A ....Rail Saws
693-B.....Rail Grinders and Drillers
693-C.....Railway Commission, Board of
698 .....Recorder's Court
698-A .....Receipts
706 .....Revenue Passengers
711 .....Rifle Range, Pointe-aux-Trembles
712 .....Right-of-Way
722 .....Roofing
732.....Royal Trust Building

S

744 .....Sand
744-A .....Sand Boxes
744-B .....Salt Bags
744-C .....Sand Drying Plant
748 .....Scales, Track
773.....Secret Service Reports
776 .....Semaphores
778 .....Sewers
779 .....Shanties
783 .....Shelters
786 .....Shims
786-A .....Shovels
788 .....Sidings
792 .....Signs
803 .....Snow Removal
803...Snow Melters (Electric)
808 .....Special Work
811 .....Spikes, Track
817.....Stations and Platforms
817-A .....Statistics, Transportation of other street railways
817-B .....Stationery
818 .....Steam Roller
828 .....Stock Inventory, Hochelaga Const. Stores
828-A .....Stock Inventory, St. Denis Yard
829 .....Stone
831 .....Stop Blocks
838 .....Subways
841 .....Switches
841-A..Sweepers and Sprinklers

T

847 .....Taxes
847-A .....Tarpaulins
848 .....Telegrams
848...Telephone and Telephone Numbers
858...Ticket Offices and Waiting Rooms
858-A .....Ties
858-B .....Tie Rods
858-C .....Tie Plates
862 ....Tool Inventory
862-A.....Tools and Machinery Department
864 .....Track Maintenance
864 .....Track Costs
864-A....Track Extensions and Renewals
864-B .....Track Removals
865 .....Traffic
870 .....Turbines

V

881 ..... Valuation (contract)
881-A.....Valuation (Terminal Line)
884.....Vernon B. (Personal)
885 .....Victory Bonds

W

903 .....Water Meters
903-A .....Water Mains
913 .....Welding
920 .....Wheels, Car
950.....Working Force, Reports
951.....Work Orders, Current

Y

955 .....“Y's”
958 .....Youville Shop

The letters of a file are placed in a smooth, stiff expansion folder, bearing a non-breakable clip and an extended metal nameplate or label holder. The numbers of the main file headings run from 1 to 1,000. These numbers, combined with direct name guides, and a generous use of alphabetical sub-divisions and file headings will care for 20,000 files.

The sub-division of files without the use of auxiliary numbers is further facilitated by the use of colored labels. All file headings, guides and name plates are staggered in the file cabinet boxes, so that when a drawer is opened the names of all files are visible in alphabetical sequence under the main file number.

The outside box plates show the file number, main headings and alphabetical sequence.

When a file is removed, an “out” folder is inserted. This contains sufficient information to permit the file to be traced promptly to the borrower.

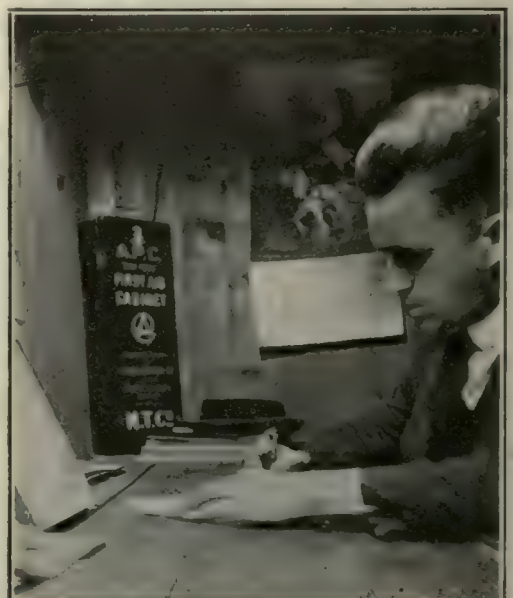
Several copies of the file index were distributed among the staff, so that the file numbers soon became known and the work of the file clerk was considerably facilitated.

This plan of filing through the use of the guide numbers minimizes the possibility of replacing a file in a wrong location. These guide numbers prevent a file from going very far astray, even if, as is true in some cases, there are several hundred files covered by one file number. It may be of interest to note that the revision of the filing system involved the rereading and reclassifying of 15,000 files, averaging 250 letters per file.

Revision of Forms

The filing system having been put in order, the next move was the overhauling of all forms used by the en-





At Left—Checker's Portable Shanty. At Right—Checker at Work in His Portable Shanty



Office Facilities for the Checkers, Inspectors and Timekeepers

gineering department. A committee was appointed from the staff to carry out this work. There were found to be about seventy-five forms in use, many of which had become obsolete, while others did not call for sufficient information.

The whole system of forms was put on a logical basis. The forms were numbered consistently and standard letter-size sheets were used for them where possible. Careful consideration was given to interlocking forms; that is, those which have to be checked against each other, or preliminary reports which lead up to summarized statements. In the revision of these, generous use was made of reference and serial numbers with a view to correlation with the filing system.

Finally, provision was made for storing the forms in the head timekeeper's office, in closed cupboards divided into compartments. Stock cards are used to check quantities on hand, consumption and dates of orders and deliveries.

Accommodations for Field Staff and Records

As the investigations continued it was found that the office accommodations for timekeepers, inspectors, clerks and material checkers, both in the field and in the main office, did not enable these employees to produce the best results on account of the limited facilities at their disposal.

The first thing done was to overhaul all of the shanties used in the field. These were enlarged and rebuilt in collapsible form to permit of rapid dismantling and erection in moving from one location to another. The sections of the shanties were numbered and fitted with hooks and bolts. The exteriors were painted dark green and the interiors battleship gray. Provision was also made for electric lighting and heating of the shanties by means of temporary connections to the overhead wires, through the co-operation of the superintendent of power plants.

Each shanty is furnished with a table, stools, locked drawer, large stationery box and first-aid cabinet. Each timekeeper is given a list of stationery required and from time to time he is supplied with a reasonable quantity of each item.

At headquarters an office of ample size was fitted up for the use of the traveling checker, excavation permit clerk, excavation inspectors, paving inspector, material checkers and timekeepers. Arrangements were also made for handling the executive work in connection with the operation of the permit agreement covering excavations through right-of-way, covered in an article by the writer in the issue of this paper for April 29, 1922.

The general instructions to checkers and timekeepers were next brought under review. A revision of these was made in connection with the changes already described. As these instructions show clearly the way in which the work of these men is done they are reproduced below:

General Instructions to Timekeepers and Clerical Staff Revised

General

Checkers shall report to and receive instructions from the chief clerk in the chief engineer's office. They shall also do all clerical work requested of them by the foreman on the job and render him all assistance possible.

Checkers shall also render all assistance possible to the timekeepers from the accounting department or the engineers from the chief engineer's office.

At the beginning of a work order there will be placed a small shanty to be used as an office by the checkers and general foreman only, with a counter and a drawer which can be locked, where the checker can keep all his records.

During the absence of the checker, the checker's shanty must be locked. The general foreman must not allow any one access to shanty in the checker's absence.

Where it is not possible to have the use of a free telephone the checkers will be allowed to use pay telephones and charge the cost of same to a petty cash account to be sent in to the chief clerk.

Unless absolutely necessary, the checker shall not leave the work while it is in progress as he will be held personally responsible for the receiving and sending of all material.

All daily reports are to be forwarded to the chief clerk's office not later than 10 a.m. of the following day.

All semi-monthly reports to be sent to reach the traveling checker's office not later than the 3d or 18th of the month.

DUTIES OF CHECKERS

1. Timekeeping.
2. Field ledger.
3. Requisition and credit slips.
4. Receiving and sending of material.
5. Rehabilitation sheet.
6. Interruptions to traffic.
7. Requests for cars.
8. Discharge slips.
9. Moving public utilities corporation poles, etc.
10. Tickets for men.
11. Assist engineer to measure work.
12. Keep list of tools for foreman.
13. Distribution of labor.
14. Distribution of material.

1. TIMEKEEPING

At about 7 a.m., 11 a.m., 2 p.m. and 6 p.m., the checkers shall travel over the job and take the time of the men, making distribution over the items noted in Sec. 13.

At each of the above times he will take the time of the workmen by asking for and making note of workman's check.

Any man arriving late or leaving early must first find the timekeeper and report or he will not be paid for his work. Any man working only part of a day will be paid to the nearest half hour.

The checker will also make out the daily time sheets with the distribution mentioned above and send sheets to the chief clerk the following morning. All time sheets are to be made out in rotation of numbers, and no time sheet shall be destroyed, but if made out incorrectly, a sheet shall be marked "Canceled" and sent to chief clerk.

At completion of work all time sheet blanks left shall be sent to chief clerk. Every time sheet issued to a checker is to be accounted for.

2. FIELD LEDGER

Material. The checker shall keep a ledger in a loose-leaf book provided with a separate sheet for each kind of material, showing material received and returned daily.

These ledger sheets will give the requisition number or credit note number and way bill number with date and car number, and quantity and kind of material.

On the fifteenth, and at the end of each month, the checker shall make out a list of all material received and returned during the half month and forward to the chief clerk.

Labor. Checker shall also keep ledger sheets for labor in his loose-leaf pocket book, and after the time sheets are made out, shall enter daily on a ledger sheet the distribution of the time over each of the thirteen distributions.

The total amount charged against each item shall also be sent twice a month to the chief clerk as outlined for material.

These ledger sheets must be kept up to date daily.

At the end of the work the complete field ledger shall be sent to the chief clerk.

W. O. Number Pending. While a W. O. number is pending, returns should be made out in the usual way and forwarded to the office under the heading, "W. O. No. Pending."

3. REQUISITION AND CREDIT SLIPS

When directed by the foreman, the checker shall request material by making out the requisitions in triplicate giving full particulars of the materials required and the W. O. number; these requisitions in duplicate to be sent to the stores department the day previous to time when the material will be required, when possible.

One requisition book shall be used exclusively for material used on the work, and one book for miscellaneous items such as tickets, cars, etc. No requisition is to be destroyed, should it be made out incorrectly, but shall be marked "Canceled" and left in the book. At the close of the work the requisition books are to be sent to the traveling checker and every requisition in the books must be accounted for.

Any corrections or copies of requisitions shall be made by crossing out the errors and writing in the corrections. Figures or notations are not to be erased.

No materials will be delivered by the stores until they first have received a requisition except in the case of stone, sand and cement, which shall be handled as follows:

The checker will make out a requisition for the above three items required and across the face mark "No Charge" and forward it to the stores by 4 p.m. of the day previous to the time the material will be required. The same day the material is received the checker will make out a requisition for the actual amount received, giving car number and way bill number, and forward requisition to the stores, with his requirements for the following day.

All materials returned to stores or to another job shall be covered by four copies of a credit note, giving a full account of the material work order number, etc. Three copies of the credit note or transfer slip are to be given to the motorman and a fourth copy to be signed by the motorman and retained by the checker, who will enter car number thereon.

The same instructions relative to correcting and forwarding of requisitions to the chief clerk at end of work shall also apply to credit notes.

4. RECEIVING AND SENDING MATERIAL

All material sent to the work shall be personally received by the checker, who will sign the duplicate way bill covering shipments. The original copy of this way bill must be kept by him. On the checker's copy of the way bill is to be marked the requisition ordering this material, and at the end of the work all these way bills are to be turned in to the chief clerk. All material received must have duplicate way bills, and if these are not sent in at once, chief clerk should be notified.

All material sent from the work shall be personally sent by the checker, who will make out the proper credit notes as outlined in Sec. 3.

5. REHABILITATION SHEETS: FORM NUMBER

These sheets are to be made out daily giving all information as to progress of work and weather report only; giving locations from chainage marked by the engineer.

6. INTERRUPTIONS TO TRAFFIC AND ACCIDENTS

The checker shall make report daily of all interruptions to traffic, giving cause, time, car and address number, and if caused by other than Montreal Tramways, the name of the person or company with all information obtainable.

The checker shall make report daily of any accidents to people or vehicles other than Montreal Tramways employees, giving time, cause, name and address, as well as names and addresses of two or more witnesses.

In case of accident to employees of the Montreal Tramways, blanks provided shall be filled out.

All of the above reports are to be sent daily to chief clerk.

7. REQUEST FOR CARS

The checker shall make requisition for all construction cars necessary, to be forwarded to store keeper at St. Denis yard not later than 3:15 p.m. of the day previous to that on which they will be required.

8. DISCHARGE SLIPS

In case of the discharge of an employee it shall be the duty of each checker to fill out a form, which shall be signed by foreman and given to man discharged.

Discharged employees shall be sent to timekeeper at the Cote St. construction office between 5:30 and 6:00 p.m. of the same day for their pay.

In case an employee leaves the employ of the company he shall not be given the above form, but must wait until the following day for money due him.

9. PUBLIC UTILITIES CORPORATION POLES

Should it be necessary during the progress of the work to move any property belonging to anyone other than the Montreal Tramways, the checker shall at once notify the chief clerk in writing, giving complete information.

In case of emergency, the checker should telephone the chief clerk, afterwards confirming the message in writing, but in no case shall the checker or other employee deal with the property owner direct.

All work performed in conection with above shall be divided for labor and material, also a division made to indicate work done by anyone other than the Montreal Tramways.

10. TICKETS FOR MEN

It shall be the duty of the checker to supply workmen with two car tickets per day, making distribution when he takes the time at the end of the day.

Requisitions for tickets are to be forwarded to the chief clerk the day previous to that when tickets will be required.

11. MEASURING WORK

The checker will give any assistance asked for by an engineer coming to the job to measure work, etc.

12. TOOLS AND CEMENT BAGS

The checker will keep the lists of tools and empty cement bags for the foreman, but the foreman will count tools each night and will also furnish the checker with all information relative to tools received and sent away.

The checker will also be furnished with a list of empty cement bags by the foreman, which must correspond with the number of full bags received. A form to show the number of empty

bags is to be made out by the checker and sent to the chief clerk on the 15th and at the end of the month as well as a final report on completeion of work.

13. DISTRIBUTION OF LABOR

Labor charges in connection with straight track are to be kept separate from those of special trackwork.

(*a*) *Removal of Paving:* Includes cost of removing paving blocks, and piling, cleaning, loading, shipping and unloading old blocks.

Includes cost of removing paving base to bottom of ties and block paving.

Includes, for all other types of permanent paving, removal of paving surface and paving base to bottom of ties.

For pavings which are not permanent, such as macadam, this includes excavation down to bottom of tie.

(*b*) *Grading:* Includes cost of concrete, stone, macadam or earth excavation to grade and cost of excavation for tile drains.

(*c*) *Removal of Excavated Material:* Includes cost of removal of excavated material, cleaning up street and loading material on cars. If material is to be wasted, unloading is to be charged to this item; if removed for use as ballast or backfill on any other job, unloading is to be charged to the proper item for other job and number of work order to which it is sent is to be shown on daily report.

(*d*) *Temporary Track:* Includes cost of loading and unloading material for temporary track.

Includes cost of laying track and backfilling, also cost of removing, reloading and return of material to yard.

(*e*) *Track Foundation:* Concrete slab includes cost of unloading material, mixing and laying concrete; stone or cinder foundation includes cost of unloading and spreading of material whether stone, cinder or macadam.

(*f*) *Straight Track or Special Trackwork Removal:* Includes cost of removing rail, ties and all track material and loading, shipping and unloading and sorting of same at yard by a representative of construction department. Should the crane car have been used in doing this, a note to that effect should be made under this item on the final report.

(*g*) *Straight Track or Special Trackwork Laying:* Includes cost of loading, shipping and unloading of rail and track material, rail bending, laying rail on special trackwork, placing ties and tie rods, gaging, spiking and bolting and all labor in connection with track laying.

(*h*) *Track Drains:* Includes cost of laying 6-in. farm tile drain, and excavation for and installation of standard track drain basins and their connections to sewer.

(*i*) *Tamping, Lining and Surfacing:* Includes cost of unloading and handling of tamping material, whether done by machine or by hand, lining tracks or special trackwork and surfacing.

(*j*) *Paving Base and Wearing Surface:* "J. B." paving base includes cost of unloading of material, mixing and laying of concrete.

"J. S." wearing surface includes cost of unloading material, recutting blocks on job, laying sand cushion, rail plaster, laying blocks, mixing grouting material and grouting where block paving is laid.

Includes labor of laying asphalt top and binder when such paving is used.

Includes labor of laying special concrete top course when concrete paving is laid.

A separate record of quantities of material used in "J. S." wearing surface must be maintained in ledger, that is to say, material used for grouting, rail plastering and sand cushion. If possible, please notify head office when sand cushion is being laid.

(*k*) *Backfilling:* Includes cost of unloading material, filling track, use of steam roller.

(*l*) *Overhead Charges:* Include wages of head foreman, checkers, water boys, messengers and watchman.

(*m*) *Miscellaneous Charges:* Include cost of laying crossings, cutting and changing curbs and sidewalks, removal of hydrants, poles, etc., and rearrangement of public underground utilities.

15. FINAL REPORT AND SKETCH

The checker is to note in a pocket note-book or on a sketch, as the work progresses, and have ready for transfer to the final report immediately on completion of the work, the following:

1. Location of concrete slab.
2. Location of stone, cinder or macadam ballast, where used.
3. Location of new or old paving blocks of each brow, each track and devilstrip separately.
4. Location of track drains.
5. Location of switch drains, state whether connected to sewer or not.
6. Kind of rail, and kind of joints used.
7. Kind of rail removed.
8. Location of making up guards of open track curves.
9. Location and length of temporary track, noting side of street in which same is laid and date of removal.
10. Location of all switch points, center of diamond crossings, beginnings and ends of curves where possible.

Anything out of the ordinary is to be noted where M. T. standard type of construction is specified and anything contrary to specifications where special construction is called for.

Should a checker experience any difficulty in making his sketches, he can have them made for him at the engineering office by request to the chief clerk.

On completion of a job all unused track material is to be returned to St. Denis construction yard and a proper credit note made out.

If tools are to be returned to the tools department, the cost of removal will be charged against the work order just completed. If they are removed to another job, the cost will be charged to the work order to which they are removed.

Boston "L" Employees Complete Course in Practical Electricity

WITH a dinner at the Harvard Club of Boston on April 30, and the award of 140 certificates to employees completing the course in practical electricity under the Division of University Extension, Massachusetts Department of Education, the Boston (Mass.) Elevated Railway signalized the successful termination of a new project to furnish instruction to interested members of its personnel.

Last September Edward Dana, general manager of the company, offered a course in practical electricity under the state division in co-operation with the board of trustees of the company, and about 330 employees enrolled. Weekly lectures and home study comprised the program. Among the subjects included were the flow of electricity, electrical units and laws, types and connections of electrical instruments, electric circuits of the simpler types, measurement of power, motors, generators, etc. The course required one night a week for about twenty weeks, and the interest was so marked that a day class was established and maintained for the benefit of those whose hours of duty precluded night attendance. A $5 fee for text books and other accessories was required on admission and was refunded on completion of the course.

Instruction was in charge of Charles O. Bourne, chief electrician, Boston Navy Yard, assisted by Robert E. Lee of the Boston Navy Yard and George E. Wilmarth of the Wentworth Institute, Boston. The course ended on April 13, and of the 140 graduates, thirty-seven men were from the maintenance department, thirty-seven from the transportation department, twenty-nine from the department of rolling stock and shops, eight from the power department, and three from the department of wires and conduits.

At the dinner, Mr. Dana was toastmaster. Congratulatory addresses were made by James F. Jackson, chairman board of trustees, Boston Elevated Railway; President Samuel W. Stratton of the Massachusetts Institute of Technology; James A. Moyer, director of the Massachusetts Division of University Extension, in the absence of Payson Smith, Commissioner of Education, Massachusetts, and Charles O. Bourne.

In appreciation of their work, the three instructors were presented with gold pencils by their classes and each also received a sum in gold from the students. Each graduate received a certificate, a photograph of a class in session and a copy of Elbert Hubbard's "Message to Garcia."

City Transit Conditions Compared

Supervising Inspectors of the New York City Transit Commission Visit Fourteen Cities and Report on Observations Made

AN INTERESTING summary on transit conditions in fourteen cities has recently been submitted to George L. Lucas, acting chief executive officer New York Transit Commission, by Walter E. Edgerton and William O. Smith, supervising inspectors of the commission. The observations are based on a trip of twenty-nine days between Nov. 8 and Dec. 7, 1922, and the cities visited were Boston, Syracuse, Cleveland, Detroit, Chicago, Milwaukee, Minneapolis, St. Paul, Omaha, Kansas City, St. Louis, Cincinnati, Pittsburgh, Cumberland, Baltimore and Philadelphia. An abstract of the conclusions, with two of the tables presented in the report, follows:

RAPID TRANSIT SERVICE

In rapid transit service in the cities noted, the principal point which impressed these observers was the large number of trains operated in the loop district during the maximum rush hours by the Chicago Elevated Lines. During the morning rush hour, they say, the company operates 193 trains per hour in double track operation, making all station stops. Some of the methods used to maintain this high standard of operation are double platform lengths so that two trains can stop at the same station at the same time, the use of platform men at stations to accelerate train movement, and the operation of trains over track line intersections in groups. The length of station stops has also been reduced by increasing the number of trains so that a train is not held up because passengers have trouble in boarding and alighting, due to the crowded condition. It is thought that some of these methods can be applied in New York. The report also calls attention to the fact that in none of the three cities with rapid transit systems visited are guard railings used for protective purposes on the edge of station platforms. Both the Boston and Chicago systems, however, use them to some extent to segregate streams of passengers going in different directions.

The observations on surface car operation are much more extended than on rapid-transit service. Messrs. Edgerton and Smith say, in their report, that they were much impressed with the progressive attitude found in many cities in trying out new and improved methods for equipment and operation. This was particularly true in connection with car design and especially with the one-man type of car. They found the principal criticism of the original Birney car by operating men was the lack of entrance and exit facilities. This design provided for a narrow entrance so that the motorman could control the traffic as it boarded the car, but at heavy transfer points this made the stop altogether too long. The operation of the Adams double-truck one-man car in Chicago was observed, and the report makes this complimentary comment:

> It is the best one-man car yet devised, and we believe that it has a much broader field of usefulness than any other one-man car. It is our belief that this car with its double truck, light weight body, seating capacity of forty-five and a weight of 633 lb. per passenger, with the roomy effect which it presents, is far superior to all other one-man cars. The car was observed under the various operating conditions and appeared to meet every requirement. This includes speed, running time, quick loading and unloading facilities and its capacity for handling large loads conveniently with a minimum amount of discomfort to passengers. This car would have a place in any of the systems in our city, and would be a wonderful improvement over all of our present one-man car operations.

They consider the Birney car "to have a place somewhere in nearly every system, especially for handling very light traffic or to improve conditions on a very light line, but a unit that is able to care for only thirty passengers at one time is necessarily limited as to its use." They consider the car with a turnstile on the rear platform a decided improvement over the Birney car, in that it has more entrance and exit facilities and the rear entrance permits a much better distribution of the load, though this car increases the running time by about 10 per cent over two-man operation.

They also point out that many of the cities claim that a car of the Peter Witt type, perhaps with minor modifications, is best adapted to handle their traffic, but that local conditions are often controlling in the choice of car. For instance, they say, the extremely cold weather during the winter season in Minneapolis and St. Paul makes it necessary for cars used there to be kept closed as much as possible, so that a car with a side entrance is out of the question. Two tables accompany the report, one listing the rolling stock in the several cities and the other giving traffic statistics. Both are reproduced.

TRAIN OPERATION

The inspectors were particularly impressed with the development of the use of trailers to a large extent in many cities, but particularly in Cleveland, and with the speed and simplicity with which trains of motors and

TABLE I—EQUIPMENT OF SURFACE CARS IN FOURTEEN CITIES

		One-Man Cars						
	Surface Cars Owned	Motors	Trailers	Birney	Others	Articulated	Single End	Center Entrance
Chicago	3,193	3,101	92	11	...	...	0	0
Philadelphia	2,801	2,691	110	...	219	0	75	1,160
Boston	1,649	1,429	220	...	75	115	.....	396
St. Louis	1,549	1,370	179	10	8	Open Cars Only	1,342	282
Cleveland	1,509	1,055	454	....	5	0	1,055	Tr. 428 M. 433
Baltimore	1,500	1,400	100	50 Mod. B 30	20	Yes	0	Tr. 100
Detroit	1,495	1,276	219	250	...	....	All	.....
Pittsburgh	1,210	966	244	....	Few	0	50%	40%
Minneapolis and St. Paul	1,035	1,035	..	0	0	Sev.	All	None
Kansas City	744	722	22	94	30	....	All except 20	None
Milwaukee	685	575	110	....	100	**72	.....	.....
Cincinnati	675	615	60	....	*75	0	Nearly all	Tr. 60
Syracuse	180	180	...	....	100	0	Nearly all	Some

* Not used as such.
** Company has thirty-six three-truck, two-car trains; is building twenty-five more, and intends to build twenty-five more next year.

TABLE II—TRAFFIC RATIOS ON THIRTEEN RAILWAY SYSTEMS

				Car-Miles per		
Companies	Rev. Pass. per Car-Mile	Rev. Pass. per Pass. Car	Pass. Rev. per Rev. Pass., Cents	Car-Hour	Mile of Single Track	Passenger Car
Boston	6.8	194,943	9.56	11.3	93,547	28,789
Cleveland	8.2	219,189	....	6.0	107,895	26,872
Chicago, Surface	6.3	274,512	7.69	8.7	111,605	43,323
Chicago, "El"	3.6	120,580	9.29	....	256,689	33,637
Minneapolis and St. Paul	7.3	268,864	6.00	10.0	65,970	36,731
Kansas City	5.1	210,755	7.55	9.2	80,465	41,290
St. Louis	6.4	242,444	6.91	9.3	96,141	38,027
Cincinnati	5.6	200,240	8.14	8.5	72,095	35,885
Baltimore	6.6	237,905	6.82	8.4	81,774	36,233
Philadelphia	7.9	282,234	6.54	9.3	119,385	35,906
Third Avenue Ry., N. Y.	10.9	293,970	4.89	7.7	81,908	27,807
Brooklyn City R. R.	9.3	295,165	4.98	8.0	114,403	31,603
New York & Harlem Ry.	10.9	308,023	4.98	7.4	147,307	28,350

trailers are made up in that city. They say that motor cars without trailers are used during the middle of the day, but at the approach of the rush hours trailers are attached to many of the motor cars as the latter pass the depot, the cars being coupled in the street, and the time taken is no longer than that of an average car stop. They also point out that in cities with steep grades, as Kansas City, St. Louis and Cincinnati, the use of trailers is limited to certain lines on account of the grades.

BUS COMPETITION

In no city did they find a thoroughly organized bus system in competition with the street car lines at the same rate of fare. The Detroit Motor Bus Company seems to be doing well with three lines and contemplates extending its system, but the fare is 10 cents, whereas the street car fare is only 5 cents. The Chicago Motor Bus Company also charges 10 cents fare. Baltimore is practically the only city where the street car system has gone into the operation of motor buses as an adjunct to surface car operation, and here the buses are only just beginning to show a profit. They liked the de luxe bus service as operated in Milwaukee and think it would be feasible for some runs in New York. The fare in Milwaukee on these buses is more than 3 cents a mile with a minimum charge of 25 cents, and in New York such service might be the means of relieving the streets of many of the privately owned automobiles which contain but one or two people.

One of the principal objects of the trip was to study rush hour conditions in the cities visited. On this point the report concludes as follows:

> An inspection and analysis of service and traffic in fourteen cities showed us that the rush hour conditions are practically the same all over. Through some contributory cause the loading may be a little above or below the average, but taking the entire system in each of the cities and comparing them to the New York systems during the rush hours you will find very little difference in the density of the loading. The rush hour peak is generally shorter in other cities and there is no such traffic density anywhere else in the country as we find on the main East and West Side Interborough subway lines; but to a stranger, the conditions at the Park Street station on the Cambridge subway line in Boston, the Thirteenth Street station on the subway line in Philadelphia, and the Thirty-third Street station on the Lexington Avenue subway line in New York show very much the same conditions of service and overloading. The same thing would hold true at the intersection of Grand Avenue, Halstead Street and Milwaukee Avenue in Chicago, of Woodward, State and Gratiot Streets in Detroit, or of Flatbush Avenue, Livingston Street and Lafayette Avenue in Brooklyn, as to the traffic and service on street surface lines.
>
> In other words, due to the abnormal increase in traffic during the rush hours over the other hours of the day, the companies find it necessary to carry a great many passengers standing, and these conditions are no worse in New York, as far as the street surface cars are concerned, than in the other cities.

The Northern States Power Company has used radio communication successfully in quickly locating "trouble" on its lines. When the two St. Croix transmission lines tripped out at 1:55 p.m. on Jan. 30 both telephone lines to St. Croix were put out of commission. F. J. Gerlich, superintendent of the service department, lost no time getting to the radio set and upon tuning in immediately heard the wireless operator at St. Croix calling Minneapolis. By means of radio-telephone communication the trouble on the transmission lines was quickly cleared up, and both lines were back in service by 2:05 p.m. (within ten minutes). Wire telephone communication was not re-established until half an hour later.

Novel Traffic Tower an Aid to Railway

Electric Device on Tubular Steel Pole Controlled from Booth at Curb Makes Possible Installation at Center of Intersection

THE presence of electric railway tracks in the street often complicates the problem of traffic control by making it impossible for the directing authority to place himself in the exact center of an intersection. If the ordinary "Go—Stop" semaphore is used, it must be placed on one side of the street, and it is difficult for traffic on the opposite side of the street to see the semaphore over the tops of passing vehicles. This results in confusion and delay, from which the railway suffers quite as much as the vehicular traffic. In order to overcome the difficulty the Department of Public Safety of the city of Scranton, Pa., working in conjunction with



Specially Designed Traffic Tower in Scranton, Pa.

the Scranton Railway, has designed a traffic signal somewhat different from any that is used elsewhere.

The signals are given by colored electric lights facing in the four directions. The tower is so slender that it can be placed in the center of the roadway directly between the street car tracks and is sufficiently tall so that it cannot be obscured by passing vehicles. An operator comfortably housed in a booth at the curb operates the signal. The upright, supplied by the railway company, is an 8-in. tubular steel pole, 16 ft. in height, set in a pyramidal concrete base, as shown in the accompanying illustration. The box at the top to house the lenses and lights has a clearance of 14 ft. from the pavement. The clearance is an important point, because a lower box might be damaged by a motor truck passing too close. Eight lights are located in this box, a red and a green on each of the four sides. Four additional red lights are set around the base of the pole for use as a warning of the presence of the tower when the upper lights are not in operation.

All the lights are manipulated by the operator at the curb, whose position is raised sufficiently so that he can clearly see traffic approaching from any direction. By a single motion he changes one set of lights from green to red, stopping one movement, and simultaneously the lights controlling cross traffic from red to green, starting the other movement. When the lights change a

gong rings to warn pedestrians. An electric heater is provided in the booth for the comfort of the operator, and it is planned to replace the heater with an electric fan when the weather makes the latter more desirable.

The first of these towers was installed about Jan. 1, 1923, at Lackawanna and Wyoming Avenues. On weekdays the operator is on duty from 9 a.m. to 7 p.m., those being the hours of heavy vehicular traffic on Lackawanna Avenue. When he leaves the booth he switches on the red lights at the base, which remain throughout the night as a warning. The performance of the apparatus has been so satisfactory that it is now proposed to install similar traffic towers at nine other intersections in the congested district.

After careful study of the movement of street cars turning into and out of Lackawanna Avenue, it has been decided that better results will be obtained by having each tower independent of the others, rather than having them interlocked. The operators should co-operate with each other to expedite the movement of traffic, but it is thought that it would delay movement if the several signals were controlled at all points by the conditions at any one point.

Plush Seats for Safety Cars

New Cars of the Chicago, North Shore & Milwaukee Railroad Have Separate Exit and Entrance, 23-In. Aisle and 36-In. Seat Width—Comfort of Passengers Chief Consideration

A DISTINCT step in the direction of making transportation more salable has been taken in the design of twelve safety cars recently placed in service by the Chicago, North Shore & Milwaukee Railroad on its city line in Milwaukee, Wis. The idea of making the ride as attractive as possible has been the governing consideration. In doing this, it is notable that the interpretation, in terms of equipment, of this conception of selling a ride is almost entirely responsible for all deviations from the standard safety car.

Briefly, the car has been designed with increased length and width. The additional length has gone into longer platforms with double doors to permit simultaneous loading and unloading and hence faster schedules. The addition in width has permitted a wider aisle and wider seats. But in point of comfort and appearance, the seats are far better than the slat seats with which the earlier safety cars were equipped, and they are also considered by the company a decided improvement over the more generally used rattan seats. The seats used are of full spring construction, covered with a figured green plush, and manufactured by Hale & Kilburn.



Exterior of North Shore One-Man Car



Interior of North Shore Car Showing Plush Seats

The increased length and width of the cars necessitated larger sections for the side frames and platform supports. The weight is 19,700 lb. light, and the seating capacity thirty-two. The cars are provided with standard safety controls and air brakes. The inside of the car is finished in cherry. Electric heating is used with Railway Utility Company thermostatic control. The trucks follow closely the Cincinnati Car Company's standard design, but they have been strengthened to accommodate the increased body weight. The trucks have a standard 8-ft. wheelbase and are equipped with two GE-264 motors. Wheels are 26-in. rolled steel. The trucks are also equipped with Smith-Ward slack adjusters.

The principal dimensions of the North Shore car ars as follows:

Over-all length	29 ft. 6 in.
Platform length	5 ft. 6 in.
Over-all width	8 ft. 1½ in.
Door opening (clear)	24 in.
Aisle width	23 in.
Seat width	36 in.
Seat spacing	28 in.

From the above it will be noted that the North Shore car is approximately 1½ ft. longer than the original standard car and that the platform has 1 ft. of extra length. The width has been increased by 3 in., while the aisle width has been increased from 21 to 23 in. and each seat has been given 1 in. additional width. The seat spacing is the same as that of the standard, namely 28½ in. The car has been designed for one-man operation only, and has proved very satisfactory in the Milwaukee service.

The farebox is located in a convenient place, easily accessible to the entering passenger and the operator in charge of the car. To facilitate operation transfers are issued only at a transfer point, where the passenger leaves the car. This has, to a great extent, lightened the work performed by the operator.

United States Consul B. S. Hayen, Leipzig, in a report to the Department of Commerce, reviews the German government's present effort to circumvent the coal shortage by electrification of the State Railways. By demonstrating the superiority in service and economic efficiency of electricity over steam it is hoped to offset the handicap to German railway transportation resulting from the occupation of the Ruhr coal fields and the deliveries previously made under the Versailles Treaty. Not only railways, but factories, will be compelled to use electric power. Lack of coal has forced the German State Railway Administration to withdraw a large number of trains.

Carrying Safety to the Public—I

Increasing Volume of Traffic Emphasizes Need for Consideration of Street Accidents—In Sixteen Years Automobile Deaths Have Increased Thirty-five Times — Remedies by Legislation Are of Questionable Value—Organized Safety Campaigns Have Reduced Fatalities Greatly

By C. W. Price

Vice-President in Charge of Safety, Elliott Service Company, New York City

EDITORS' NOTE: The continuous growth of motor vehicle traffic makes the problem of accident prevention yearly more important for the electric railway. Fairly consistent work has been done in promoting safety in the railway's own organization, and with good results, but the larger work of making safety a community-wide activity remains to be done. Just how to go about this from the point of view of the railway executive, and what may be accomplished, will be told in a series of ten articles, of which this is the first. The author has had a great deal of experience in this work. For twelve years he was with the International Harvester Company, during which time he organized the twenty-three plants for safety. For four years he was assistant to the Compensation Commission of Wisconsin, working on the drafting of a complete new code of laws covering safety. In 1913 he assisted in organizing the National Safety Council, afterward serving as vice-president, field secretary and general manager. During the war he directed the work of organizing for safety in all the arsenals and navy yards. He has done pioneer work in organizing local councils and in promoting public safety and safety instruction in the public schools.



C. W. Price

THE editor of the ELECTRIC RAILWAY JOURNAL has asked me to answer this question: Can the public be reached with the safety idea? Or to put the question in another form: Can safety be organized in a community as successfully as it has been organized in the great industries, with a continuous campaign of education which finally will grip the interest of all of the people and cause them to stop being careless and begin being careful? My answer is that it can be done. However, if I would convince the practical electric railway executive I must not only prove that it has been done but I must tell how it was done.

In succeeding articles I shall, therefore, outline those features of an organized community effort which have proved determining factors in reaching the public in cities where substantial reductions have been made in accidents. During the past three years a definite plan of organization and a program of activities for community safety have been developed. These are as well defined as the program for a great industry, a program which if applied in any community with the same leadership will realize equally satisfactory results.

But in this first article I wish to present some facts regarding the present accident situation and the status of public opinion.

A recent analysis of the accident experience of a number of electric railways revealed the significant fact that from 65 per cent to 75 per cent of the accidents could not be prevented by any effort on the part of the employees, no matter how loyal they were to the safety idea; if prevented at all it must be by reaching the drivers and pedestrians on the streets.

It is not necessary to remind any railway man that the traffic situation is rapidly growing more complex and difficult to cope with. A recent analysis of accidents in representative cities of the United States showed that over two-thirds of the accidents on the streets were due to automobiles and trucks.

It is difficult for us to realize how new this problem is in our community life. Before 1906 or thereabout there was no automobile problem. In that year there were only a few thousand machines, and the government reported 374 deaths caused by automobiles, while in 1922 there were 12,357,376 automobiles thronging our streets and highways and, according to insurance statisticians, approximately 13,900 lives were sacrificed by this new and giant hazard. Seven people were killed by automobiles for every one killed by street cars.

A factor in this problem which has not been recognized sufficiently is this: Fifteen years ago the majority of the owners and drivers of automobiles were citizens of some means and responsibility. Today the millions of cheap cars manufactured and the enormous number of second-hand cars thrown on the market each year make possible the ownership of cars by a class of citizens, especially young men, who are of the more reckless type—men of little sense of responsibility. Add to this list the rapidly increasing number of drivers of taxicabs and trucks, many of whom are incompetent. Then picture these thousands of swiftly moving cabs and trucks and automobiles fighting their way through narrow streets, many of which were laid out for horse-drawn vehicles, and we have a suggestion of some of the factors which are daily adding to the complexity of the problems confronting the railway executive of today.

In many cities, during the past two years, the toll of deaths and injuries reported in the daily press has aroused public sentiment to a point where the people are demanding that something be done to control the evil.

As is usually the case in a sudden fit of alarm, all sorts of remedies are being suggested. Some insist that what is needed is more police, better traffic judges, heavy fines, and even the imposition of jail sentences.

These people forget the perfectly obvious fact that law enforcement is possible only as soon, and no sooner, as public opinion is developed to a point where, first, it will tolerate law enforcement, and, second, demand that the laws be enforced. The experience of every city in which successful work has been done in controlling the accident situation emphasizes the fact that there is only one final solution—an organized community-wide educational campaign, which will reach every man, woman and child and change his attitude and habits. To appreciate what such a campaign will mean we only need to recall the campaign for better sanitation and health which during the past twenty years has so greatly improved our habits of life. Consider the vital place which health instruction has come to occupy in our homes, our schools and the newspapers and magazines. Safety must come to occupy just such a place in our community life if we would solve the accident problem.

St. Louis, Milwaukee and Washington are good examples of what can be accomplished through organized effort, as is shown by the following records:

	Accidental Deaths		
St. Louis	1917	1922	Per Cent Reduction
Total deaths	510	334	34
Street railways	32	14	56
Steam railways	50	20	60
Industrial	110	15	86
School children	50	25	50
Automobiles (per 10,000 machines)	32	13	60
Milwaukee	1919	1921	Per Cent Reduction
Total deaths	320	243	24
Automobiles (per 10,000 machines)	26	12	54

In Washington, D. C., remarkable results have been achieved by the first two months of organized work. A "Safety Week" was conducted the last week of November, 1922, and a permanent organization was developed during January, 1923. The record for February and March, as compared with 1922, shows that the total deaths were reduced 32 per cent, the total traffic deaths reduced 43 per cent, and the total children's deaths reduced 65 per cent.

The experience of some dozen cities in which community safety has been organized has taught us that certain factors are indispensable to obtain success in the initial steps in developing a permanent organization and in the promotion of the continuous campaign. Since these articles are written primarily for the attention of railway executives, who in their respective communities may be called upon to take an active part in developing a safety organization, it may be well here to outline somewhat in detail these factors:

1. Where there is a Chamber of Commerce safety should be organized as a department of it. This plan provides for a permanent anchorage of the movement in an institution of standing and is in line with the growing tendency among business men to centralize civic activities and to avoid the multiplication of new organizations.

2. Because the success of a safety campaign depends on the wholehearted co-operation of a large number of individuals and organizations, it is exceedingly important that the president of the organization be a citizen of standing who will command the confidence and support of the whole community. Such a man is necessary to draw into the organization strong men and women who will act as chairmen and members of committees. In a number of cities the movement has ended in failure because of the lack of such leadership.

3. In the larger communities it is absolutely essential to the success of the work that a paid secretary or manager be employed to give his entire time to it. Because community safety is of such recent development, it is difficult to secure a man of experience for this position. Therefore, in many cases it is necessary to select some local man and train him. Given a fair education, the two indispensable qualifications in such a man are leadership and organizing ability.

4. There are two successful ways of financing a safety organization. The first is to finance it out of the budget of the Chamber of Commerce. The Milwaukee Safety Council is a good example of this plan. The second plan is to secure contributions from those business concerns which will be financially benefited, such as the public utilities, industries and concerns having commercial vehicles on the streets. Under the second plan, it has been found that where accidents are reduced as the result of a successful campaign and a corresponding reduction in insurance premiums is made, the concerns are willing to renew their contributions each year.

5. The following has been found to be a practical working plan for a safety organization:

President.
Vice-presidents, three or more.
Manager.
Treasurer.

The following committees:

Finance	Drivers' School
Publicity	Industries
Police	Women's
Schools	Traffic
Posters	Speakers

Statistics

The officers and chairmen of committees constitute the executive committee.

It is important in the initial stages of developing an organization to secure the support of all city officials who are in a position to give co-operation, such as the mayor, chief of police, superintendent of schools, traffic court judge, coroner and street commissioners. These officers should be given important positions on the committees.

6. In a subsequent article, the subject of publicity will be covered more fully, but at this time I wish to point out the necessity in the initial steps of giving wide publicity to the plan of organization and the program of activities. It is difficult for the average person to understand how a community-wide safety effort can be organized that will reach all of the people. In order to convince them, they must be shown in a simple and constructive way just how it is to be done. In addition to daily publicity in the newspapers, it is advisable to issue a small leaflet containing an outline of the organization with the names of the officers and a brief description of the various activities. It is also advisable to have speakers appear before the representative clubs of business men and present the scope and purpose of the campaign.

Resistance to Water Flow Through Valves

EXPERIMENTS made in the laboratories of the University of Wisconsin* have shown that in the flow of water through valves and pipes from ½ to 12 in. in diameter, globe valves offer from fifteen to forty times the resistance of gate valves, the ratio increasing with the size of the valve. The length of straight pipe of the valve size which will produce the same loss of head as the valve varies from ¾ to 4 ft. for fully opened gate valves and from 20 to 35 ft. for fully open globe valves. In the case of globe valves the smaller valves are equivalent to the greater length of pipe measured in pipe diameters.

The loss of head in clean, wrought iron pipe from ½ to 12 in. diameter is

$$H = \frac{0.0B19}{d^{1.16}} V^{1.9}$$

where H is the loss in head per 100 ft. of pipe; V is the velocity of flow in feet per second and d is the pipe diameter in feet.

*See Bulletin of the University of Wisconsin, Engineering Series, Vol. IX, No. 1, by C. I. Corp and R. O. Ruble, U. of W. Engineering Experiment Station, Madison, Wis.

Freight Business Built Up By Making Special Schedules

Petaluma & Santa Rosa Railroad Adopts the Slogan "Last to Leave, First to Arrive" and Campaign for Freight on the Basis of Service

THE Petaluma & Santa Rosa Railroad connects San Francisco with the fertile valleys of Sonoma County by steamer across San Francisco Bay and via Petaluma River to Petaluma, whence the company's rail system reaches out to farming communities that produce heavily in perishable commodities, such as poultry, eggs, berries, fruit, etc. Most of the territory served is traversed by excellent paved roads, and because the districts are all prosperous automobiles are plentiful.

Under these conditions the passenger travel is comparatively light and there is good opportunity for effective service in the rapid transportation of freight. Special attention has, therefore, been given to arranging schedules that would be most convenient to freight shippers; also to building spur tracks to warehouses wherever it was at all possible, regardless of the amount of tonnage offered at the time and with the idea that the track facilities would increase the tonnage. So far, company officials report, there has not been a single case where these spurs have not proved to be well worth while. The company's freight business has been increased almost 30 per cent in the past year, tonnages handled for the past six years being:

1917	133,173 tons	1920	140,082 tons
1918	120,077 tons	1921	159,950 tons
1919	114,256 tons	1922	204,024 tons

Of the 11,000 acres planted to apples, which are tributary to the system, only 4,000 acres are yet in full bearing and the yield should increase at the rate of 25 per cent annually. The present apple shipments over the railway total about 1,000 cars annually. About the same number of cars of eggs are also handled. Both commodities are shipped in refrigerator cars, the eggs being consigned chiefly to New York and the apples to all parts of the United States. The demand for the apples is particularly good due to their being about three weeks earlier than apples grown in other parts of the country.

Freight schedules are arranged to afford an overnight service each way between San Francisco and the points served by the railway. Southbound freight schedules are fitted to the needs of each commodity produced in the territory served, the objective always being the delivery to the markets as early as practicable after the commodity is harvested. This can be done so effectively that fruit or berry growers and poultrymen can place today's produce on the breakfast table in San Francisco tomorrow morning.

In the opposite direction freight can leave San Francisco late in the evening and reach the northern termini early in the morning. Thus retail dealers, by phoning the San Francisco wholesaler as late as 4 p.m., can receive goods desired by 7 a.m. on the following morning. This condition enables the retailer to do business on small capital investment and to carry only small stocks.



Apple Packing Plant on Electric Line



Commerce Chamber Taken Over the System

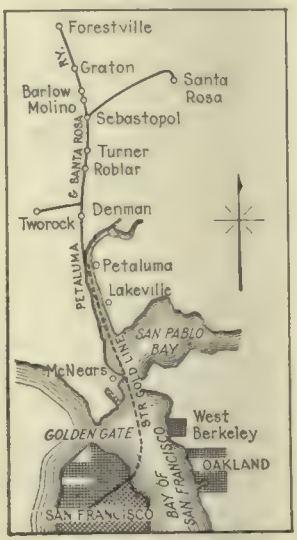




A Number of Apple, Berry and Other Fruit Shippers Depend on the Petaluma Line for Fast Service

Thus he does not need to risk losses on stock that does not move readily or which deteriorates rapidly, and his insurance, interest on investment and storage requirements are lower.

The company has not overlooked the opportunity to advertise the fact that this overnight service makes faster time than the U. S. mail. A consignment of freight delivered to the company's wharf in San Francisco at 4 p.m. will reach the consignee at 7 o'clock on the following morning, while the invoice mailed in San Francisco at the time the goods were shipped is not delivered until noon of the next day.



Rail and Boat Route of P. & S. R. Ry.

The passenger patronage on this system consists almost entirely of rural residents traveling between their ranches and trading points. In 1916 approximately 800,000 passengers were handled. In 1922, despite considerable growth of the territory, the number of passengers handled had decreased to 600,000 annually. This decrease has been due largely to the increased use of privately owned automobiles. Thus far there has been no commercial competition of auto stage or freight companies.

The slogan "Every employee a business solicitor" has been most effectively carried out by this company, as described in the ELECTRIC RAILWAY JOURNAL of June 10, 1916, page 1097. A feature of the company's public relations work is the practice of taking the members of the Chamber of Commerce of the principal towns served over the line so as to keep them familiar with improvements and other company activities. Every effort is made to tie the line as closely as possible to the community. The general manager belongs to all Chambers of Commerce and sees to it that the real value of the company's service to the community is properly kept before the people.

Time Saver on San Francisco Railway



Mirror at Entrance to Tunnel in San Francisco

THE mirror shown in the accompanying illustration has been placed just inside the west entrance to Twin Peaks tunnel, in San Francisco, to enable the motormen to see if the trolley wheel is on the trolley wire before starting through the tunnel.

The Readers' Forum

Way Engineer Emphasizes the Importance of Wood Preservation

PUBLIC SERVICE RAILWAY COMPANY
NEWARK, N. J., May 7, 1923.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for April 21 there appeared an editorial entitled "There is Economic Necessity Behind the Wood Preservation Movement." This, I feel, is worth enlarging upon at this time because of the extreme importance of the subject to our industry.

In the issue of the paper for March 18, 1922 (pages 460-462), I discussed an article on the accounting features of tie treatment, written by Earl Stimson, chief engineer of maintenance, Baltimore & Ohio Railroad. I incidentally took advantage of the opportunity thus offered to explain the timber situation in this country as disclosed by government statistics, available to everyone interested enough in the subject to send for copies. I also outlined some of the essential economic features of wood preservation, presenting facts which cannot be controverted. They showed the actual unfortunate timber situation in the United States at that time, and conditions are certainly no better today than they were when the figures quoted were compiled. The data are worthy of being taken out of the file and given careful thought and study.

Not more than 25 per cent of the original timber of our country now remains standing, and the annual growth is only about 35,000,000,000 ft., board measure, as against an annual consumption of from 100,000,000,000 to 110,000,000,000 ft., board measure, out of which only about 1,500,000,000 ft. is being treated for all purposes. How long are we going to ignore the "handwriting on the wall"?

The wood preservation committee of the American Electric Railway Engineering Association, which is functioning this year for the first time as a special committee, is endeavoring to bring the existing wood preserving specifications of the association up to date, and to present for adoption as many additional specifications as practicable, following along the lines of most generally accepted practice. In this way our member companies will have at their disposal up-to-date information as to what they can and should do. But in the final analysis the situation that confronts us is very well covered by the old proverb: "You can lead a horse to water, but you cannot make him drink." Unfortunately it is too late to "lock the stable door after the horse has been stolen." How long are we going to remain blind to the facts?

Part of the ultimate solution is, of course, in immediate and extensive reforestration. But in the meantime, until the results of this work are available for consumption at least a generation or more hence, wood preservation must be practiced on a much larger scale than at present, in order to reduce rather than increase the rate of timber depletion. There is a considerable range in the matter of choice of treatment to be used, the effectiveness of the different methods being very largely proportional to their respective costs, but regardless of the costs the expense is more than justified

by the results obtained and any treatment is better than none at all. Effective wood preservation is not limited to the use of coal-tar creosote oil, although this has always been recognized as the most effective. There is a satisfactory treatment for every use to which timber is put and for almost every kind of timber used for construction purposes. Every dollar spent in this way will be returned through the resulting increase in the useful life of the material treated and the accompanying reduction in the annual charge for depreciation.

HOWARD H. GEORGE,
Engineer of Maintenance of Way.

Three-Car Detroit Train Compared with Two-Car Milwaukee Train

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY
MILWAUKEE, WIS., May 5, 1923.

To the Editors:

The article on the latest idea in articulated cars in the April 28 issue was of particular interest, as this type of car has received a good deal of attention from us. The argument for a train of this type, on account of its advantages as to track space occupied for the number of passengers carried, is entirely patent, but when it comes to the advantage claimed in economy by reducing the platform labor expense through minimizing the number of car operators, we wonder if the proposers of the three-car articulated train have not overlooked something in the arrangement to produce the maximum economy in this respect.

This three-car train with four operators does not produce any saving over the three-car multiple-unit train or the motor car and two trailers, such as are operated in Boston and elsewhere. The articulation of two cars with the arrangement which we brought out for Milwaukee in 1920 permits the operation of a train seating 104 passengers with two men.* Comparing the figures given for Detroit's Woodward Avenue line, their proposed two three-car articulated trains would require eight men for 300 seated passengers, whereas three of our two-car articulated trains would require but six men for 306 seats.

We built our trains out of two old cars, and were therefore limited somewhat in the seating capacity which we could install; but on new construction it is conceivable that the seating capacity could be increased somewhat more on a two-car unit, and still keep within clearance lines.

The only other feature of the articulated three-car train, as proposed, which might limit the usefulness of such an outfit would be that its length (113 ft. over all) would make it somewhat unwieldy to handle in the shop, especially on transfer tables or under usual crane arrangements.

J. H. LUCAS,
Superintendent of Rolling Stock.

*Milwaukee's three-truck train was described in the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1921, Vol. 57, page 131.

Association News & Discussions

Commerce Chamber Discusses Transportation

Large Attendance at Meeting in New York This Week—Principal Topics Considered Were Finance and Co-ordination of Various Means of Transportation, Especially Steam Railroad, Highway and Vessel

THE Chamber of Commerce of the United States, which met in Washington a year ago, chose New York as the place of its eleventh annual convention, which took place May 8 to May 11. There was a large attendance, and the American Electric Railway Association was represented by a committee of ten members with ten alternates. The official topics, according to the program, were "Transportation in All Its Phases in the United States" and "Europe and Europe's Affairs." Actually, the papers and discussion on transportation were practically limited to steam railroad affairs, transportation on the highways and maritime matters. It is understood, however, that the work of the five special committees on transportation which have been appointed by the chamber for a comprehensive study of all phases of the transportation situation will include the function of the electric railway in the transportation scheme. Some phases of this study were brought out at the meeting of the transportation and communication group on Wednesday afternoon, when progress reports were read of the subcommittees of this group.

At the meeting of national councillors of the chamber, held on May 7, for the nomination of directors, two electric railway men were nominated, namely, Philip H. Gadsden of Philadelphia to represent the second district, and Paul Shoup of San Francisco as head of the Department of Foreign Commerce. They were subsequently elected by the delegates at large. The choice for director of transportation and communication department was A. L. Humphrey, Westinghouse Air Brake Company.

GENERAL MEETING ON TUESDAY

The general plan of the convention was the holding of general meetings in the mornings of Tuesday, Wednesday and Thursday, group luncheon meetings in the afternoons of Tuesday and Wednesday, with a general business session on the afternoon of Thursday, and general meetings each evening with addresses by speakers of national importance or some other program of general interest. This report relates particularly to matters of electric railway interest which came up at the different meetings.

Some statistics of national import presented in the address of President Julius H. Barnes at the general meeting on Tuesday morning were that since 1900 the population of the country has increased 40 per cent, the volume of food production 38 per cent, the volume of mine production 128 per cent, the volume of factory production 95 per cent. The per capita annual earnings in the United States in 1850 were approximately $100, in 1890 approximately $200, and in 1920 approximately $600. The total national wealth is now $300,000,000,000. The freight car of 1875, which was 65 per cent dead load and 35 per cent earning cargo, has been developed so that now there are cars 20 per cent dead weight and 80 per cent earning load. Per railroad employee in 1922, the railroads of the country showed 243,000 ton-miles and 21,600

passenger-miles. Per $100 of capita investment the record was 1,750 ton-miles. During the last year the use of the motor truck has been developed, until last year the actual tonnage listed by it exceeded 50 per cent of the tonnage of all the railroads combined, indicating that the subject of transportation must be studied and developed in wider aspects than railroad development alone. This has led to the appointment by the chamber of five special committees to study various phases of the transportation situation, namely, railroad consolidations, governmental relations, relative rates, motor transport and waterways.

In an address on Tuesday evening Herbert Hoover, Secretary of Commerce, mentioned the greatly increased consumption of conveniences and comforts per capita of the population, which, he maintained, is normal progress. He also outlined some of the methods by which commerce and industry may keep the nation permanently prosperous. On the first point he said that we must get away from the notion that pre-war standards of living and volume of business would be normal now. We have been able to add to our standards of living by more general distribution of many articles and by increased efficiency of production and distribution.

He referred to the present industrial recovery and said that the government index shows wholesale prices today about 30 per cent below the crest of 1920, but 6 per cent above that of nine months ago. Increases in price, he said, are a necessary accompaniment of business recovery. We are undoubtedly in a plane of prosperity and should be able to discipline ourselves so as to hold onto it. One great need is the willingness of people to save their enlarged earnings, another is caution as regards over-expansion and credit.

Mr. Hoover said that now there is a tendency to an increase in the construction of buildings, railways and plant and equipment generally, as well as federal, state, and municipal construction. Tax-free securities lie at the base of a good deal of the last, but in the speaker's opinion all government work of this character except that which is essential should be deferred in times like these.

Group Meetings on Tuesday

At the meeting on Tuesday afternoon of the finance group, one of the papers was by Pierpont V. Davis, vice-president National City Company, on the subject of credit requirements of the railroads from the standpoint of the investor. Among other things Mr. Davis pointed out that there had been a great change in the investment market due to the income tax law and the large number of tax-free securities issued. Large investors were turning generally to these tax-free securities and selling their railroad and other taxable securities. He knew of one very large estate which had now only about a million dollars in taxable securities.

The average sale per customer of taxable securities by his concern is $3,500, whereas before the war it was ten or twenty times that. Another factor in the reduction of the demand for railroad securities was the competition for funds by foreign nations and the issue of securities by public utility companies to a much larger extent than twenty years ago. Referring to the railroad situation he spoke of the plans for valuation which had been urged by some with the idea that the railroads were greatly over-capitalized, whereas it is now found they are considerably under-capitalized.

The civic development group discussed immigration. John W. O'Leary, chairman of the immigration committee of the Chamber of Commerce, said the present 3 per cent law is wise as a temporary policy, but it is not a permanent solution of the problem. This must be worked out on a selective basis, which will give preference to the more desirable classes of immigrants. Much can be done to help out the labor shortage by shifting the unemployed from certain industries to others where they are needed. For example—the 250,000 coal miners said to be unnecessary can be placed in other lines of endeavor.

Congressman Albert Johnson, chairman of the House committee on immigration, thought that future legislation is likely to be tighter rather than looser. The present law allows a possible annual influx of 357,800 persons, and for the present year all but 45,000 have already arrived. The committee on immigration of the House wants to go back to 1890, as the status for basing the new law. This is so as to give more weight to the Northern races of Europe. In future legislation provision must also be made to take care of relatives of those who have already come to this country.

Allen T. Burns, of the Carnegie Corporation, showed that, contrary to general belief, the southeastern countries of Europe have sent immigrants who have become naturalized sooner than those from the older, northwestern countries. He said that the applicants for citizenship were largely from among the skilled workers.

At the meeting of the fabricated production group, Robert S. Binkerd said the annual average freight haulage per inhabitant in the United States was about 4,000 ton-miles, or ten times the average in Europe. This situation must lead to ultimate decentralization of production, he said. As showing the development of this idea during recent years, mention was made of the growth of satellite communities on the outskirts of large cities, and the movement of factories to smaller towns. In the discussion which followed it was suggested that the closed shop question had had some effect in causing manufacturing plants to seek new locations. This was admitted, but it appeared to be the sense of the meeting that a certain amount of decentralization was the ultimate solution of the freight transportation problem.

The discussion of the domestic transportation group centered in cost reduction by elimination of transportation wastes in distribution. A factor in this, said W. Lee Cotter, is proper warehousing with the aid of pool-car shipping. The pool car is a car fully loaded but containing consignments for different consignees, distribution being effected through the largest consignee or, preferably, through a public warehouse. Other speakers backed up Mr. Cotter in his statements. The general plan of store-door delivery by the railway was urged by W. J. L. Banham, who said that the plan has been widely used in Canada and elsewhere, and has been successful. The object is to relieve congestion at terminals and expedite delivery. Discussion in general favored Mr. Banham's proposition.

The group on transportation and communication confined its discussion on Tuesday afternoon to maritime matters.

General Session on Wednesday

The meetings of Wednesday began with a general session at the Metropolitan Opera House with President Barnes in the chair. The topic of the morning was "Developing a National System of Rail, Water and Highway Transportation." There was an address in favor of waterways by C. A. Newton, member of Congress from Missouri. This was followed by an address on "Co-ordination of Railroads, Waterways and Highways," by Charles H. Markham, president Illinois Central Railroad, who thought that the public was sometimes deceived as to the relative cost of furnishing the various forms of transportation because of the expenditures made out of public funds for the construction and maintenance of navigable waterways and hard surfaced highways. The taxpayers foot these bills, whereas the rail lines bear the expense of the roadways used by them. Thus, between 1910 and 1922 more than $3,000,000,000 was expended in this country upon the construction and maintenance of good roads, toward which the operation of motor vehicle carriers contributed comparatively little. In the speaker's opinion, the destruction of lightly built roads by heavy trucks was so great as to call for some remedy, and he suggested the construction of short stretches of hard surfaced roads designed primarily for the use of motor trucks, to be built only where the conditions were favorable to their use and where the saving, as compared with rail transportation, would be sufficiently large to justify the expense.

There was also an address on highway transport by Roy D. Chapin of the Hudson Motor Car Company, who urged a study of the place of the motor vehicle and its co-ordination with other facilities of transportation. Surveys by the Bureau of Public Roads and the State Highway Department in Connecticut, he said, showed that in that state 36 per cent of the motor truck traffic

was hauled a distance of 9 miles or less, 31 per cent between 10 and 29 miles, 19 per cent between 30 and 69 miles, and only 14 per cent more than 70 miles. Most of this haulage was within the state, and that for long distance was largely made up of special commodities, such as furniture, where the packing, handling and breakage charges made truck haulage cheaper than if the movement had been by rail. He believed that actual competition of the motor truck with the steam railroad was negligible, except for short hauls which the railroads consider unprofitable. He urged the construction of the railroad terminals in the suburbs of cities rather than in the centers and distribution of freight from them by trucks.

Group Meetings on Wednesday

The meeting of the transportation and communication group on Wednesday afternoon was devoted entirely to progress reports of the special committees to investigate various transportation topics, appointed by President Barnes. These committees, of which there are five, will report to a general transportation committee, whose personnel has not yet been completed.

The first report was on governmental relations to transportation and was submitted by George A. Post, who said the committee was studying different clauses of the railroad act and was unanimously opposed to government operation. Carl R. Gray, chairman of the committee on railroad consolidation, pointed out that this committee was considering the national aspects only of railroad consolidations and that its work would in no way interfere with or overlap that of the Interstate Commerce Commission. His committee reached the opinion that the economies possible by consolidation were not very important, but there were other advantages, such as reducing the problems of car interchange and rate adjustments. F. A. Delano reported for the committee on adjustment of relative freight rate schedules, and was followed by A. H. Swayne for the sub-committee on the relation of highways and motor transport to other transportation agencies.

Mr. Swayne said that this committee had organized three sub-committees, one to review the field of motor use outside of the terminal area, the second the field of motor use inside of the terminal area, and the third the legal aspects of highway transport in its relation to other carriers. P. H. Gadsden is chairman of the third committee. Arrangements have been made to secure data and other assistance from various government bodies, and the American Electric Railway Association will supply figures on the cost of operation of electric railways. The facts as assembled will be correlated either by government officials or the staff members of the committee. Assistance to the legal committee, of which Mr. Gadsden is chairman, is being given by the National Automobile Chamber of Commerce, which is preparing a statement of the municipal regulations of common carriers on the highways, by John E. Walker, former tax adviser of the Treasury Department, who is studying taxation of rail, motor and electric carriers; by the American Electric Railway Association, and by the Bureau of Public Roads. The committee has already secured enough facts to show that there is a broad field for the supplemental use of the motor bus and the electric railway and that some method of co-ordination is possible which will eliminate unnecessary competitive charges to the public, while still preserving the flexibility of service in which the public is most interested.

Progress was also reported by the committee on development of waterways and co-ordination of rail and waterway service by its chairman, W. L. Clause.

In the foreign commerce group meeting, George L. Duval explained some of the difficulties involved in marketing American goods abroad. J. Walter Drake, Hupp Motor Car Corporation, gave several fundamental principles which apply to the export of American manufactures in general. These are: (1) Mass production permits competitive prices. (2) Personal contact is needed with foreign selling agencies. (3) World markets are essential to balance domestic commerce. (4) The new tariff allows for prompt adjustment with nations which are favorable to us. (5) The success of any American industry abroad adds to the prestige of the others.

The session of the natural resources group was devoted to the subject of coal. A report of this meeting appears in another column.

At the meeting of the insurance group, Hon. Robert L. Luce, former Justice of the Supreme Court of the State of New York, said that regulation, which had been enforced on public utilities, is now being applied also to the insurance business. In England the insurance business is unregulated, and the rates there are correspondingly lower.

Asa S. Wing presented a table showing the investment in railroad securities by the life insurance companies from 1860 to 1922. Prof. William Leslie spoke in favor of government regulation of insurance.

A special meeting was arranged on Wednesday afternoon to discuss taxation. This group made the following formal recommendations, which were referred to the board of directors before going to the resolutions committee:

1. Capital gains and capital losses should not be recognized for income tax purposes.

2. The present 50 per cent maximum surtax should be reduced to 25 per cent.

3. There should be a general sales tax of one half of one per cent on turnovers to make up for proposed repeal of the so-called "nuisance" taxes, such as excise taxes on theater tickets, club dues, and occupations of various kinds.

4. There should be created a court of income tax appeals, entirely separate from the treasury department, which would sit in various parts of the country, so that persons and corporations might settle their cases with the government near their homes.

General Sessions on Thursday

This session began with an address on the farmers' interest in transportation, by O. E. Bradfute, president of the American Farm Bureau Federation. This was followed by an address on the need of financial support for the railroads by W. N. Doak, senior vice-president Brotherhood of Railroad Trainmen. The speaker declared that the employees' interest in adequate financial support for the railroads must be apparent to all and that those employees who do not feel such interest should seek other fields of endeavor. Labor is also opposed to Federal ownership, control or operation. He saw help from the efforts of the Chamber to study the railroad situation. The public should be educated to adopt a sympathetic attitude toward the railroads and toward their employees in their efforts to furnish transportation, and much good can undoubtedly be accomplished by both railroads and employees going to the public with a joint appeal for fair dealing.

The final address of the session was by Walter W. Head, first vice-president American Bankers' Association, whose topic was the re-establishment of railroad credit. He pointed out that in 1920 railroad securities reached the lowest point in their history and the quotations today still are far below the normal trend of such prices in the years prior to 1914, though the roads were carrying the greatest traffic in their history and their efficiency has increased. The great need now is for increased facilities, especially terminals.

Two elements that enter into every loan are, first, whether the tangible assets are worth the outstanding capitalization, and second, the prospects for future growth. As regards the first point, in 1921 the Interstate Commerce Commission has valued the roads for rate-making purposes at considerably more than the market value of the outstanding securities, and only 6 per cent less than their par value, so that any reasonable allowance for increased cost since that time supports the belief that the railroads as a whole are not over-capitalized. As regards the second test, there is a general fear on the part of the investor that the railroads are victims of too much political pressure from particular interests. The government will probably continue to control rates and to mediate the wages, but with efficient management, loyal service from railroad labor and stability of regulation, renewed confidence should come.

Resolutions

Following the practice of the Chamber, a series of resolutions was presented at the final business meeting, for approval by the delegates present.

They were offered by the committee on resolutions and embraced a variety of topics. The following were of particular interest to electric railways.

One resolution declared that the present 3 per cent limit on immigration was not adapted to present conditions. To this 3 per cent a possible added 2 per cent quota on a selected basis was recommended, and it was suggested that this might lead to the placing of all immigration on a selective basis.

As regards the railroads, it was pointed out that in 1920 the country started on a new constructive transportation policy. It was urged that this liberal policy be followed in the future, and it was suggested that much valuable information would be available from the results of the transportation conference recently initiated by the Chamber.

A pledge of co-operation with the National Coal Commission was passed, coupled with the statement that the Chamber had already gone on record in adherence to the open shop principle.

Greater attention was recommended to methods of reducing the fire loss and civil responsibility for probable loss to others caused by gross negligence was urged.

On the subject of public utility regulation the Chamber passed unanimously a resolution favoring state regulation in preference to city regulation. The full public utility resolution follows:

Regulation of public utilities has developed through its various stages until the principle of regulation through a body created by the State has been recognized throughout the country as best calculated to result in decisions equitable alike to utilities and their patrons and to determine the questions of large importance both to utilities and their owners and to the public.

The advance which has thus been made should be maintained. As the source of the power of regulation of utilities, each State should exert this power through its own agency and should not attempt to delegate it to local authorities. Such a course would represent retrogression, and its consequences would be detrimental to the best interests of the public.

Complete Unionization of Coal Mines Would Be Ruinous

The Various Remedies Commonly Proposed Are Criticised—Six Suggestions Were Made on Other Ways by Which the Coal Situation Can Be Improved

THE disastrous results which would follow the complete unionization of the coal industry was the subject of a talk given before the recent meeting of the Natural Resources Production group of the United States Chamber of Commerce by J. G. Bradley, president of the Elk River Coal & Lumber Company. He emphasized the point that since 1917 the price of coal has been governed by difficulties of distribution. Priority orders during the war time, the railroad switchmen's strike, and the shopmen's strike so interfered with the transportation of coal that they became the dominant factors in the situation.

As illustrating the effect of railroad conditions upon the coal industry Mr. Bradley said that a shortage of 20 per cent in the number of cars available added 12 per cent to the cost of production, a 30 per cent shortage added 19 per cent, and a 60 per cent shortage added 54 per cent. The latter condition is that which now prevails in the West Virginia mining district. He predicted that the time would come, however, when production costs would again govern the price of coal.

The economic future of general business in this country depends upon the proper preparation of the coal industry to meet this situation. It cannot be met, Mr. Bradley said, if labor organizations are allowed to dominate the industry. He spoke of the annual burden of $15,000,000 to $36,000,000 which is added to the price of coal in order to pay the expenses of "absentee union leaders." Comparing the productivity of union miners and non-union miners, he stated that the average production of coal per man per year in the non-union fields of West Virginia is 1,500 tons, whereas the average for the whole country including union mines is only 650 tons. He declared that complete unionization of the coal mines would simply mean granting a subsidy to a particular group of workers, with consequent increased costs.

Legislation Not Effective Remedy

None of the plans yet proposed to improve conditions in the coal industry is adequate to solve the problem, according to George H. Cushing, publisher, Washington, D. C., who spoke on the same occasion. In his opinion it would be impossible to remedy existing evils of intermittent production and price fluctuation by legislative means alone. The answer lies rather in a comprehensive scheme which will gradually work improvement in the situation by helping the coal industry to help itself.

Mr. Cushing spoke of the various remedies that have been suggested and outlined the shortcomings of each. The first cure considered was the so-called "stabilization" plan. This means arbitrarily wiping out half of the existing mines in order that the other half may enjoy full-time productive activity. Half the miners would be compelled to seek other employment under this plan. He said that it was very doubtful if any practical and legal means could be found to accomplish such an end.

The second plan to be considered was that of community storage, whereby the mines could maintain a steady production in spite of seasonal fluctuations in demand. The objection to such a proposal is that it costs from 50 cents to 60 cents a ton to put coal in storage and take it out again. Hence the stored coal could not meet the price competition of coal coming direct from the mine unless a surcharge were added to the latter. In that case the effect would be to raise the price of all coal.

Consolidation of mines by districts is another plan that has been suggested. Under this arrangement the uneconomical mines would be put on the shelf and only the more efficient ones operated. Unfortunately, the overhead and capital charges of the operating mines would be nearly doubled by this plan, and the price of coal would be increased as under the storage plan.

The fourth scheme discussed by Mr Cushing was nationalization. This would result, he said, in changing the ownership without in any way solving the problem of operation. All of the four remedies have the general fault of creating a virtual monopoly backed by the federal government. He questioned whether any private corporation would be allowed to do of its own accord what it is urged that the state undertake.

Just what the recommendations of the Fact Finding Commission now investigating the coal industry will be it is impossible to forecast at this time. Mr. Cushing said, however, that the investigation is becoming so obscure, that one might be justified in thinking that the ultimate object is to evade the issue. At the present time the great users of coal, the railroads, the electric railways, and the electric power companies, are legally held to fixed rates, while at the same time they have to purchase fuel at whatever price is demanded. A bound consumer and a free producer are incongruous. But that does not mean that the producer should therefore be subjected to price regulation also.

Mr. Cushing then outlined the steps which could be taken to help the coal industry to help itself without any revolutionary changes. He mentioned first the necessity of putting the railroads in a better position to serve the mines. A second step should be an attempt to absolutely ban coal strikes, legally when possible, and by force of public opinion. In this connection the value of staggering the dates of contract expiration was mentioned. State laws requiring a certificate of competency before a miner can work should be abolished. The non-union mine should be encouraged in every possible way as a force to counteract the power of the miners' organizations. A nine months' notice to railroads should be required when a new mine seeks a spur connection. This would discourage wildcat ventures that decrease the ability of the carriers properly to serve regular mines. Lastly, public opinion should force the acceptance by the miners of all available labor-saving devices.

Iowa Convention Date Changed

THE annual convention of the Iowa Electric Railway Association will be held at Hotel Hanford, Mason City, Iowa, June 26, 27, 28, 29, instead of June 20, 21, 22, as previously announced.

Roller Bearings for Cars*

Experience in Germany Indicates That Many of the Difficulties Experienced with Ball Bearings on Electric Cars Have Been Overcome Through Use of Roller Bearings

TESTS on roller bearings, covering very long runs, show extremely great differences in power consumption due to the use of unsuitable materials, to poor workmanship and to inadequate maintenance. The greatest advantage of roller bearings over ordinary bearings for street car service is not found in a possibly smaller power requirement, but in their considerably greater reliability, their lower maintenance cost, the less lubrication required, and the absence of chafing between armature and pole faces of the motor. In fact roller bearings permit of a reduction of the air gap, thus improving efficiency and lessening heating.

Ball bearings were found unsatisfactory for heavy street car service, partly due to too high specific stress upon the balls, and partly on account of the wrong way in which the fiber of the steel is stressed in the balls. They are made by cutting off small pieces of a round wire which are then upset. Electric contact conditions are also much better for rollers than for balls. The great superiority of roller bearings over ball bearings for heavy service is now generally admitted by all factories producing both kinds of bearings.

Roller bearings were made originally with very long rollers, sometimes five to six times as long as their diameter. The development of high-grade steel, however, resulted in a considerable shortening, until today most rollers are made with a length equal to twice the diameter or less. For very heavy bearings, somewhat longer rollers or, better, two or more rows of rollers are used.

How Performance Can Be Secured

The following basic conditions must be maintained to guarantee best performance:

1. Shafts must be sufficiently heavy to prevent bending. It is useless to install roller bearings on shafts which can bend.

2. The highest grade steel should be used for the rollers, which must not show measurable wear after several years of operation.

3. Rollers must be made with utmost precision to distribute the stress upon them equally and to permit replacement.

4. Short rollers are preferable, because long ones may cause edging.

5. Heavy inner rings which cannot be rolled over or become loose are desirable.

6. All rings upon the shaft must be firmly pressed on, and they should be so arranged that an inspection of the bearing does not require removal of the rings.

7. Shafts should be of sufficiently tough steel to avoid loosening of the rings due to the constant blows upon them.

8. A durable but light construction of the roller cage is desirable.

9. All parts should be lubricated with a thick grease. The use of hollow rollers, running on a through-going bolt, is not recommended, because reliable and satisfactory lubrication is difficult to obtain.

10. Bearings must be absolutely dust and water proof. A small amount of dust will destroy the best bearing.

11. Good lubricants, free of acids and resin, should be used.

12. Bearings should be stored in a place where rusting is prevented.

13. Great care should be exercised in installing the bearing to insure exact alignment and to avoid foreign materials.

14. Bearings should be cleaned carefully at intervals, removing all old grease.

Barrel-Shaped Rollers Counteract Bending of Shaft

The necessity or advantage of conical rollers is not recognized in Germany. One concern uses barrel-shaped rollers, to counteract any possible bending of the shaft. To take up side thrust, experience has shown that for all railway car service a bead directly on the rollers or beads on the running rings are all that are necessary. Even after years of operation no measurable side wear could be found.

Great attention is being paid to an exact and uniform tempering of the rollers, a process usually kept secret. With a double roller set, the two rows of rollers should be as far apart as possible. To permit of quick and convenient inspection of the bearing it should be so designed as to permit the removal of the rollers without stripping of the front ring. Modern bearings are so built that they permit the removal of the commutator and even the armature punchings without removing the running ring from the shaft.

Good roller bearings require lubrication only every six months or yearly. The use of thin oil is not recommended, because of the large amount required, and because it is very difficult to prevent the oil from running out of the bearing.

The economies to be had from roller bearings open up new possibilities for use in urban service of a light four-motor double-truck car. The superintendent of the Stuttgart street railway system says that 10 per cent of the balls furnished in some trial ball bearings for the road had to be replaced within three years. Later their cars were rebuilt for roller bearings, and there were no failures during four years of operation. After 155,000 miles of service, no wear could be found in the bearings. While ordinary bearings consumed 35 lb. of oil for 250 operating days, the roller bearing consumed only 7 lb. of grease.

*Abstract of a paper presented by Director Albert at the International Street Railway Congress in Vienna.

Special Meeting of Traffic Association

ON APRIL 26 a meeting of the Central Electric Traffic Association was held in Toledo, Ohio, to determine whether the electric railways would compile a tariff covering the transportation of explosives and dangerous articles on passenger cars, or whether they would participate in a similar issue compiled by the steam railroads. It was decided at the meeting that the electric lines in the central territory would participate in the steam railroad tariff. It was further decided to reissue the interline intrastate joint passenger tariff covering Ohio lines in order to include the Northwestern Ohio Railway & Power Company in the tariff. Passenger fares will be adjusted in accordance with the local tariffs of participating lines.

Central Accountants to Meet

A PRELIMINARY announcement of the forty-fifth meeting of the Central Electric Railway Accountants' Association states that the meeting will be held on July 27 and 28 in one of the gardens on the Kentucky side of the Ohio River, in or near Louisville. The trip from Cincinnati to Louisville will be made on the *Queen City*, leaving at 5 p.m., July 26, and arriving at 9 a.m., July 27. Those who take the boat will be served dinner and breakfast thereon, and there will be dancing on the boat in the evening. Those who desire to join the party on the boat should send reservations not later than May 1 to J. C. Longon, auditor Cincinnati & Dayton Traction Company, Dayton, Ohio, accompanied by $2.25 for each, this being one-half of the total charge. The balance will be paid to the purser on the boat.

American Association of Engineers Holds Ninth Annual Convention

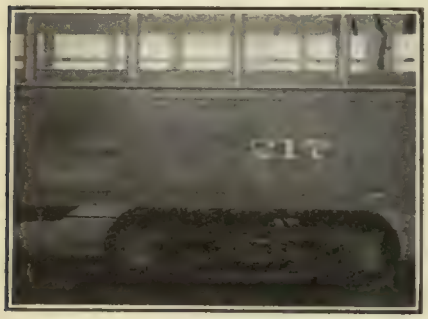
ON MAY 7 and 9 at the Monticello Hotel, Norfolk, Va., the American Association of Engineers held its ninth annual convention. Reports of standing and special committees covered the achievements, plans and aims of the association, and addresses full of both information and inspiration were given by government officials and others.

New officers of the association, as included in an announcement by the judges of election, are as follows: President, Webster L. Benham, Kansas City, Mo.; first vice-president, G. M. Butler, Tucson, Ariz.; second vice-president, Maurice Bein, Washington, D. C. The secretary of the association is C. E. Drayer, and the headquarters are at 63 East Adams Street, Chicago, Ill.

Maintenance of Equipment

Use of Supplemental Bar Strengthens Truck

THE use of an extra truss bar, supplementing the top member of the truck frame, has been found by the Buffalo & Lake Erie Traction Company to be an excellent way to prevent sagging of the truck side frame members on arch-bar trucks.



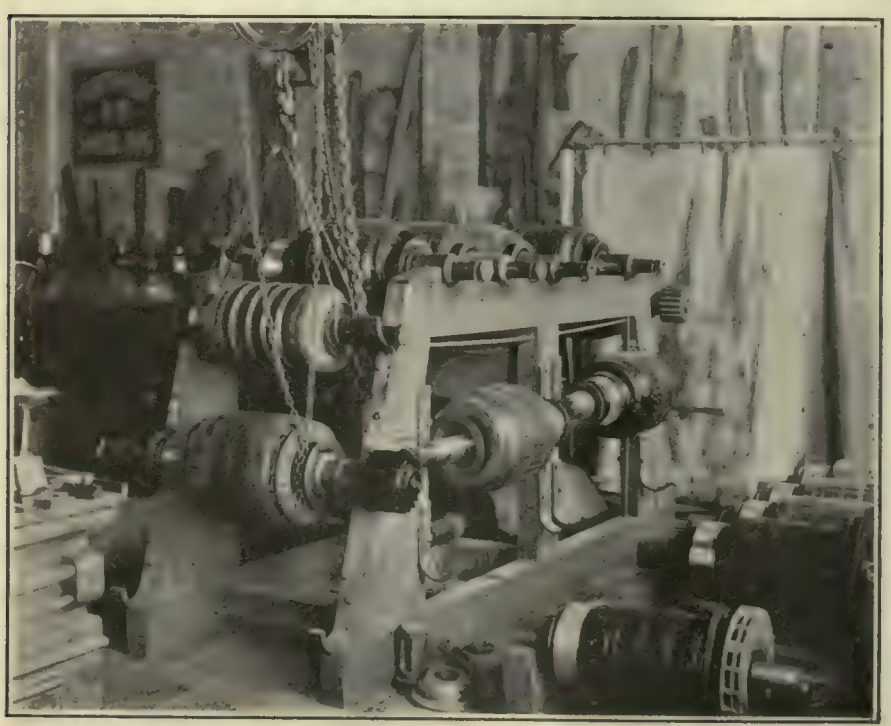
Reinforced Truck Under Low-Level Car

Considerable difficulty has been experienced because of such sagging and consequent springing out of shape of the truck frame. The trucks involved have been in hard service for some time. A ¾-in. x 3-in. steel bar was therefore bolted across the top of the truck frame on each side, as shown in the accompanying illustration. The supplemental bar is in contact with the top member of the frame over the journal boxes and bears on 1½-in. blocks at the center, thus forming a flat truss. The arrangement has proved to be a very satisfactory means to prevent springing of the truck frame and breaking of the diagonal members. All the trucks of this type are now being strengthened in the manner described.

Large Capacity Armature Rack

AN ARMATURE rack in use in the Easton shop of the Lehigh Valley Transit Company has provision for twenty-one armatures. Iron-bar stirrups are provided on the sides and ends, and the top and inside portion has grooves in the wooden framework to hold the shafts of the armatures. Four armatures are stored on each side, three on each end, five on the top and two inside the framework.

This rack is served by traveling hoists so that armatures can be picked up or installed in the rack without difficulty. Although the rack is of strong timber construction and is held together by tension rods, it can be readily picked up and moved about should it be desirable to change the location.



Large Capacity Armature Rack

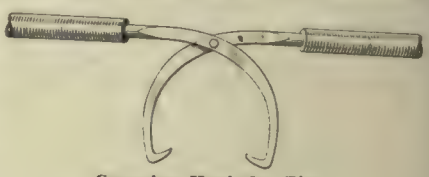
Convenient Track Shop Kinks

By J. S. WILDER

Engineer Maintenance of Way, Municipal Railway of St. Petersburg, Fla.

THE accompanying illustration shows a type of carrying hook which we have used with great success for switch ties, etc. This is made on the ice-tong principle, with iron pipe riveted to the handle to give additional length. The hollow pipe keeps the weight down.

We have found that six or eight hacksaw blades make an excellent substitute for a wood rasp. Of course new blades cut faster, but old ones cut smoother. A bolt put through the holes at either end holds the blades together.



Carrying Hook for Ties

An old stunt which I have used frequently for fixing a screw so that it cannot be unscrewed consists of filing off the two opposite corners at the slot. When this is done a screwdriver will slip out of the slot if one tries to back the screw out, but it will not interfere with turning the screw into place if the work is properly done.

Rainy days are frequently used for making various handy tools, such as different sized screwdrivers, wood chisels, etc. These are made of round spring steel. Where conveniences for tempering are not available, we have found that hammering them rapidly and lightly and then chilling them is a very satisfactory method. Round spring steel makes excellent chisels, but considerable care is required in tempering them. They must be chilled in oil and then have the temper drawn.

Sometimes a workman breaks a drill of a small size and has no other available for immediate use. In such cases a nail has been used by cutting off the head and hammering flat for about half its length. This is then sharpened with a file in a manner similar to that for flat bits, but the point should be made about twice as long and a little sharper. We do not bother to temper these small drills as they are made too easily and the hammering helps to harden the nail.

Oil Burner Used to Heat Cleaning Tank

BEARINGS, castings of various sorts, compressor parts, etc., are cleaned in the shops of the Buffalo & Lake Erie Traction Company by immersion in a tank of boiling Oakite metal cleaner and subsequent rinsing in another tank. Until quite recently the metal-cleaning tank was heated by natural gas, which is available at Erie, Pa.

This method has not proved entirely satisfactory, however, because variation of pressure made the natural gas an unreliable source of heat. Therefore a galvanized-iron flue was built in such a way that the heat of a Hauck oil burner could be concentrated against the lower part of the tank.

Three or four of these burners are used in the shops, and one can usually be found free when it is desired to heat the metal-cleaning vat. Good results and greater reliability have been secured from the replacement of the natural gas by this oil burner.

Gear Grease in Paper Cartridges

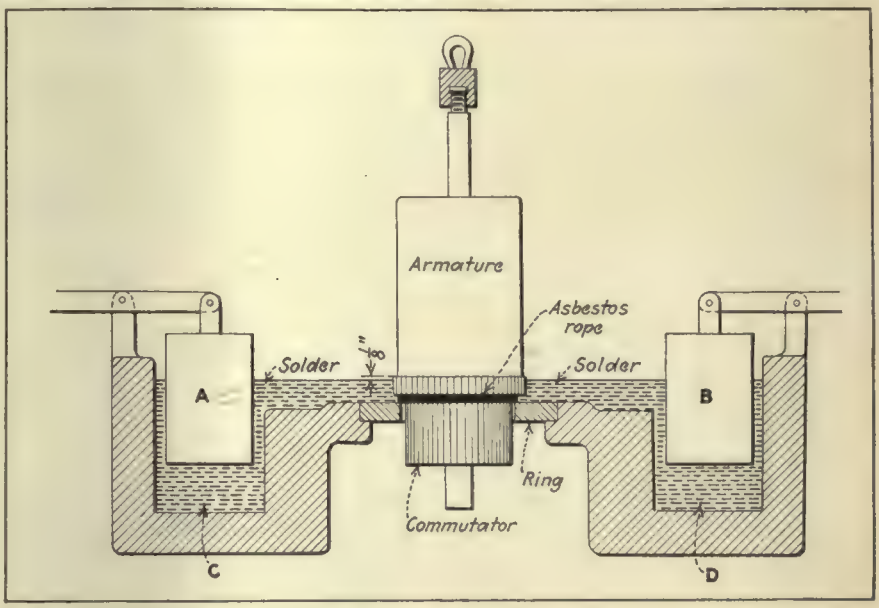
A CONVENIENT method of handling gear grease is that used in the shops of the Binghamton Railway. One pound of grease is made up into a roll about 2 in. in diameter and 8 in. long, by wrapping in a single thickness of newspaper. This paper wrapped cartridge is put right into the gears, paper and all, and it has proved to be a very handy method of applying the grease. The newspaper has no effect on the lubrication as it is ground up in the first few revolutions of the gears. No machine is used in the wrapping, which is done by an oiler during his leisure time. A supply of grease cartridges is kept on hand in the shop and their use has reduced the time spent in lubrication.

Soldering Railway Armature Coils to Commutator

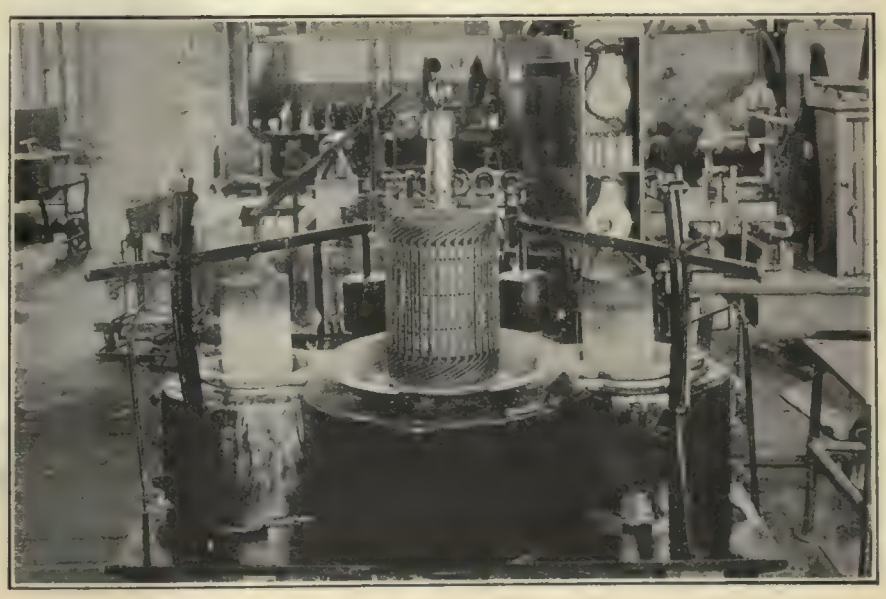
By Harry L. Signor
Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company

BEFORE armature coil leads are soldered in the commutator neck slots, dirt, oil, insulating material or paint must be removed from these parts, after which they should be tinned. A substitute for tinning, which gives very good results, is to brush the metal parts, after they have been thoroughly cleaned, with a liquid flux which is left to dry. This forms a thin coating over the cleaned surfaces. It is important in selecting a flux to see that it does not contain any acid that may get to the insulation of the coils and cause short-circuits and grounds. A good, cheap and safe flux can be made by dissolving 1½ lb. of rosin in a quart of ether or denatured alcohol.

The most common material used in soldering is the alloy known as "half and half," which is made of approximately half lead and half tin. This solder is reasonable in price, has a melting point of 180 deg. C., flows readily when heated with a hot iron, is not hard to work and takes a good hold on the metal to be soldered. Pure tin, with a melting point of 230 deg. C., can be used, but is more expensive than "half and half," requires more skill in handling be-

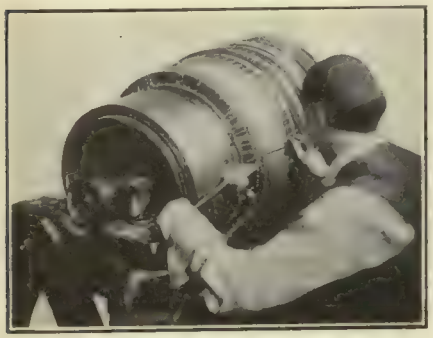


Section of Soldering Pot



Soldering Pot Used for End Connections to Commutator

cause it flows very easily and rapidly, tends to spread beyond the surfaces to be soldered and is quite difficult to use on wire coils. When motor equipments are apt to be overworked and thus subjected to high temperatures and excessive speed, pure tin is used to solder the armature leads to the commutator necks and to solder the armature bands. When



Soldering Leads at the Side of the Commutator

tin is used as solder the clearance between adjacent parts should be as small as possible. For armatures operating under normal service conditions and not subjected to high temperature and unusual mechanical strains due to high speed, the "half-and-half" solder can be used with good results.

The types of soldering irons to be selected depends upon the method to be used in heating them. The most common type is one heated in a gas flame, and for ordinary work a 2-lb. or 3-lb. iron will give good results as it holds the heat a long time. Other types of iron have self-contained heaters, with a gas flame or an electric heating element.

On many properties the soldering of leads in the commutator neck is done from the top of the commutator. With this method there is a possibility of the solder working its way back of the commutator neck and short-circuiting adjacent leads, especially when pure tin solder is used.

An accompanying illustration shows a workman soldering leads at the side of the commutator, a method highly recommended. The armature should be raised about 6 in. at the pinion end so that excess solder will flow to the front end of the commutator neck, and thus reduce the possibility of short-circuiting the back of the neck.

When a large number of commutators are to be treated, pot soldering is recommended. By this means all the armature leads are soldered in one operation, without the danger of any excess solder working back of the commutator neck. The commutator to be soldered should have two or three turns of asbestos rope of from $\frac{1}{8}$-in. to $\frac{1}{4}$-in. diameter wound around it close up under the neck. The commutator is then placed in the ring of the soldering pot as shown in the accompanying cross-section. Rings of different size correspond to different diameters of the commutators. The plungers *A* and *B* are forced down into the solder, causing it to rise to approximately $\frac{1}{8}$ in. from the top of the commutator neck.

After several minutes of contact the plungers *A* and *B* are raised, allowing the solder to recede back into the pots *C* and *D*. The armature can then be lifted from the ring, and the asbestos rope taken off. The armature should then be put into a lathe and the commutator neck and surface brushed or face machined.

Easy Method of Making Compromise Joints

THE accompanying illustration shows two compromise joints which have been in service for some time on the lines of the Lehigh Valley Transit Company, Allentown, Pa., and were made in a rapid and easy manner.

The two rail sections were placed end to end on the steel-foundry floor with a layer of sand underneath. The smaller section was blocked up



Compromise Joints Made by Pouring Molten Steel About Rails

so as to bring the top into the desired location. A board was then placed on each side of the rail and molten steel poured in to make the desired joint. Holes were drilled through the web of the rail, so that the metal on the two sides is held together through these holes.

The boards were located so that the steel when poured would not interfere with the top or gage line of the rail. The compromise joints illustrated have been in service for more than two years and are in perfect condition.

New Equipment Available

New Hat Check Saves Abuse

THE redemption department of a railway whose passenger receipts are $1,000,000 per month is said to redeem upward of 250 card tickets monthly. Card tickets usually are purchased within thirty minutes of the departure of the train. Probably all but a negligible number of these tickets are used, so that a very considerable portion of this $750 per month represented is paid in redemption vouchers for tickets on which service is rendered.



Zone Hat Check

If conductors were required to hat check all passengers in day coaches, these card tickets would be lifted, provided a form of hat check were used that could not be counterfeited, as can so easily be done with a blank form. The A. H. Pugh Printing Company, Cincinnati, Ohio, has placed on the market a zone hat check, one form of which is shown. Each check can be used to designate fifty different destinations, and by a change of the zone symbol at the top (OA in the illustration), any number of stations can be covered.

The following advantages are claimed:

1. Having the date punched, it cannot be used a second time, even though the conductor fails to lift it before the passenger leaves.

2. While perfectly simple to those holding the key, it is devised to appear quite complicated to those who might attempt to misuse it.

3. Even those who might obtain the key would be deterred by the expense necessary to counterfeit the hat check and duplicate the conductor's punch dies, besides incurring the penalties provided.

The News of the Industry

Bondholders Agreeable

Seattle Investors Willing to Wait for the Return of Money Provided City Charges Fare that Will Pay

The City Council of Seattle has received a telegram from A. W. Leonard, president of the Puget Sound Power & Light Company, at present in Boston, expressing willingness on the part of the Old Colony Trust Company, trustee for the holders of the bonds of the Municipal Street Railway, to co-operate with the City Council and Mayor E. J. Brown "in any way consistent with sound principles," provided a fare is established by the city "which will return earnings adequate to cover the obligation of the present bonds."

Mr. Leonard said in part:

> I am pleased to report willingness on the part of the trustee to co-operate with you in any way consistent with sound business principles.
>
> I do find, however, a very strong reluctance on the part of the trustee to consider any suggestion whatever along the above lines until a rate of fare is established which will return earnings adequate to cover the obligations of the present bonds.
>
> After such earnings are again established, showing the city's good faith, I believe it would be possible for you to secure favorable consideration along lines desired in the resolution, no intimation having been made before I left Seattle as to whether the city could suggest to the trustee that by his acceptance he would accomplish the desire expressed in the resolution.
>
> I, of course, have been unable to make any definite statement to the trustee covering your ideas relative to reduced annual payments.
>
> As a result of an interview with representatives of the trustee and others interested, I feel justified in suggesting the appointment of a committee representing the city to confer with the trustee in Boston and am sure such committee would be met in full spirit of co-operation in the desire, if possible, to reach some mutually satisfactory solution, as the situation will eventually resolve into the question of what proposition the city can legally make, and what the trustee can legally accept.
>
> I would recommend that the committee include among others the Mayor, corporation counsel and superintendent of public utilities.

It will be recalled that the plea of the city was for the adoption of some practicable plan under which payment of the principal of the bonds might be extended over a longer period than was contemplated in the original purchase agreement.

The City Council has referred the message to the utilities committee. Presentation by the city of terms on which it would agree to refund the securities issued to purchase the municipal system is suggested as the first step in negotiations looking to that end. Every member of the City Council has gone on record in favor of opening negotiations with the holders of the street railway bonds for an extension of time and a resolution was unanimously passed proposing that negotiations be opened. One of the plans which may be suggested for paying the bonds will be the semi-annual payment of principal, instead of annual, as at present.

Mayor E. J. Brown states that it is doubtful if an increase in fares would be wise, even in view of the language of Mr. Leonard's telegram, which suggested that the city "show its good faith" by charging a sufficient rate of fare to meet the existing bonds and other charges.

The Mayor said:

> If we can have a 4 per cent interest rate on bonds running for thirty years, it would make an ideal condition and would make it possible to retain the 5-cent fare.

The Council is now considering an ordinance which would increase the present 5-cent fare, under which the system has been losing $4,000 to $5,000 daily, to 10 cents cash, or 8½ cents token. Mayor Brown is strongly opposed to such an ordinance, and it is possible that he may veto the measure after it is passed by the Council. In that event the putting of the increase into effect would be delayed at least thirty days to permit the ordinance to be passed over his veto. A majority of the Council members favor the passage of the increased-fare ordinance immediately. They want this done before negotiations are opened with the bondholders.

Bus Service Proposed for Canton

A dispute has developed over the plan of the Northern Ohio Traction & Light Company to install bus service in Canton. The idea was to put the buses on two routes as provided for by a resolution passed by the Council. In good faith the company ordered six buses of the type used in Akron for operation on what is known as the Gibbs Avenue route and the Fulton Road route. The company is now awaiting the court decision as to whether or not the buses shall be placed in service. When the Mayor refused to grant the company a license to operate it applied to the court for a permanent injunction. The case was tried a few days ago and taken under advisement. The excuse offered by the Mayor in court for his refusal to license the buses was that the charter under which the Northern Ohio Traction & Light Company is operating did not permit it to run buses. The six buses ordered seat twenty-four passengers each and driver. They are being built by the G. C. Kuhlman Car Company, Cleveland, and cost approximately $8,500 each. They are painted orange and are identical with the Akron buses except that they are even more up to date. The bodies are mounted on White chassis.

East Liverpool Rides Again

Paving Assessment Removed and Seven-Cent Fare Allowed in Controversy with Employees

Railway service has been restored in East Liverpool, Ohio. A tie-up there of nearly a year was ended on April 16 when the City Council enacted an ordinance granting concessions to the Steubenville, East Liverpool & Beaver Valley Traction Company. The passage of the ordinance followed an agreement reached between the employees and traction officials. According to the agreement the company is granted a 7-cent city fare with a 1-cent transfer. The company is also granted a five-year exemption from street paving assessments.

The controversy in Steubenville and East Liverpool had its beginning early in 1922. It was then that C. A. Smith, general manager of the company, notified the employees that when the wage contract expired on May 1 the company would deal with the men as individuals and not with any representatives of any "so-called labor union." Overtures were made to the railway, but the officials remained firm, with the result that the men walked out. Operation on all the company's lines in Columbiana, Hancock and Beaver Counties was tied up on May 1 and service was suspended on all lines in Jefferson County on May 4.

Shortly after the walkout became effective conferences were called at Steubenville, East Liverpool and Wellsville and attended by citizens, public officials and representatives of the men, but no settlement was reached. Meetings were also held in the cities of Wellsville and East Liverpool, but no great progress was made toward arbitration. One of the reasons for inaction was that a suggested member of the proposed board of arbitration was a member of Division 285 of the Amalgamated. The city of Steubenville, however, enforced its ordinance compelling arbitration. The board of arbitration there consisted of one member selected by the employees, one by the company and the remaining three appointed by the Common Pleas Judge of Jefferson City. It met at Steubenville on May 24, but the attempt at arbitration failed.

Only once up to this time did the company try to operate its cars. This effort was made at East Liverpool on May 4, but it was followed by so much disorder that this incident terminated for the time being all efforts to restore service.

Whether the car riders in Steubenville were more anxious than riders

elsewhere to have the railway operate or whether the attempts made in Steubenville toward a settlement were more constructive than those made elsewhere, at any rate on July 10, 1922, a conference was held which resulted in the resumption of service in Jefferson County. At this final meeting in Steubenville the company did deal with the union. The wage contract signed by the men represented a cut of 5 to 8 per cent.

Meanwhile conditions remained at a standstill in East Liverpool. In the fall of 1922 the company proposed an ordinance which provided for an increase in fares and the placing of the East Liverpool situation in the hands of the State Public Utilities Commission. On Nov. 7 voters of East Liverpool defeated the railway ordinance by a big majority. The company had hoped that the passage of the ordinance would be a step toward a solution of the matter, but the defeat of the measure practically brought the matter back to the status of affairs at the inception of the tie-up.

Later a councilmanic ordinance which provided also for a fare increase met the same fate as the railway ordinance. The vote at the special election on Feb. 27 of this year was in this case 2,227 for and 2,527 against passage. The ordinance voted on called for a 7-cent city fare, a 10-cent intercity fare and a 1-cent transfer. When traction officials learned the result of the election they declared that it appeared that the people of East Liverpool did not want electric railway service. Further, they said that the company would make no effort to operate until the people showed a desire for such operation. Meanwhile interurban cars of the company had been operating outside of the East Liverpool city limits, non-union men being in charge of them.

Although at the annual meeting of the company it was stated that the strike of the employees was not discussed, shortly thereafter came word that a settlement was near at hand. The end came on April 16 after a period of 350 days. General Manager Smith announced that service would be restored immediately, and within a day cars were in use on the entire division.

City Free to Renew Attempt to Take Over Railway

On the ground that the United States Circuit Court of Appeals had authority finally to pass on the case in its legal status, the United States Supreme Court on May 7 dismissed the appeal of William R. Begg and Arthur C. Hume, receivers of the Manhattan & Queens Traction Corporation, against the city of New York and others. Future proceedings, if taken by another remedy at law, may properly be considered by it, the Supreme Court held.

Receivers were appointed for the railway when the line was only partly completed. The receivers applied to the United States District Court for an injunction against the city, alleging that the city, through its Board of Estimate & Apportionment, was threatening to adopt a resolution declaring a forfeiture of franchise and of the completed part of the line because of the failure to complete within the prescribed time. The District Court granted a temporary injunction and after a hearing made the injunction permanent. The Circuit Court of Appeals reversed this decree and ordered the injunction dissolved, whereupon the receivers appealed to the Supreme Court.

The effect of the decision is to open the way to the city, if it so desires, to renew the steps taken by it to secure the forfeiture of the franchise of the company.

Home Rule Bill Fails

Hylan's Home Rule Measures Defeated —Uncompromising Attitude Responsible

Only the absolutely uncompromising attitude of the Democratic administration at Albany in respect to regulation of service and capitalization prevented the passage of a bill during the closing hours of the legislative session which adjourned on May 4 giving to the city of New York home rule over the transit situation. The Assembly defeated almost the entire administration program by a party vote.

Working night and day the Legislature before adjournment dumped more than 700 bills into the Executive Chamber.

Five important amendments to the public service commission law were passed, however, and are now in the hands of the Governor. These bills include:

The Walker bill (Senate Print No. 1,291) fixing the price of gas in New York City at $1 per 1,000 ft. and prescribing a standard of 650 B.t.u. per 100 cu.ft.

The O'Brien bill (Senate Print No. 1,837) amending section 65 public service commission law, prohibiting gas corporations from charging for service, equipment or apparatus.

The Ryan bill (Senate Print No. 2,247) amending subdivision 1, section 49, public service commission law, by providing that commission may fix maximum rate or charge for any common carrier, or street railroad, notwithstanding that a higher rate or charge has been heretofore authorized by general or special statute. Provision for temporary increase or decrease in rates is striken out. There are other changes.

The Knight bill (Senate Print No. 2,353) amending various sections of the public service commission law relative to verification and filing of annual reports of corporations engaged in public service operations.

The Kaufmann bill (Assembly Print No. 1,848) adding a new section 53-a to the public service commission law requiring electrification of railroads in New York City.

The Legislature also passed for the second time the Ferris amendment to section 7 of Article VII of the constitution, which authorizes the use of not to exceed 3 per cent of the lands of the forest preserve for the building of transmission lines and the erection of power and generating stations for electrical development of state-owned water powers. This is, perhaps, the most important measure passed by the Legislature in many years in relation to development of water power, as without such amendment to the constitution any development of St. Lawrence power could not be carried across the Adirondack preserve. The amendment will go to the people for ratification at the general election in November.

Extension of Menominee Franchise Is Sought

The Menominee & Marinette Light & Traction Company is seeking a renewal of its electric light and power, street railway and gas franchises in Menominee, Mich. The franchises have been drawn up by the franchise committee, but in their present form are not considered fair or practicable by the company.

The electric light and power franchise of the company expired on March 25, 1921, its gas franchise expired on Feb. 28, 1923, and its railway franchise expired on April 7, 1923.

J. P. Pulliam, vice-president and general manager of the company, said recently to the Council:

> It may be urged that the company is violating the law in occupying the streets, alleys and public places of this city without a franchise. No law is being violated by the company in so doing. Such occupancy is a matter of sufferance on the part of the city. At any time that the city feels like taking the full responsibility of saying to the company that it no longer wants it to furnish light, heat, power and street railway services and no longer to occupy the streets, you have the right to do so and the company will be compelled to obey. The law of the State of Michigan has clothed you with that power.
>
> The company feels that the franchise as a whole is unsatisfactory and unworkable and the company would be doing a gross injustice to itself if it were to accede to the terms of the franchise.

Another Erie Canal Contract Award

The second contract for the electrification of the old Erie Canal bed in Rochester, N. Y., was advertised to be let by the city Board of Contract on May 9. The project, which includes the installation of rapid transit interurban passenger and freight service on the site of the abandoned canal, has been described in various issues of the ELECTRIC RAILWAY JOURNAL. The second contract is for the work between Court Street and the Rochester & Eastern Railway crossing in Brighton. The City Engineering Department estimates the cost of this installation at $1,800,000. The initial contract for the first section of the line was awarded some time ago and the work is being pushed rapidly.

Pittsburgh Wage Negotiations Continue

The receivers of the Pittsburgh Railways and the wage committee of motormen and conductors met again on May 8, but reached no agreement as to the amount of the increase in pay to be granted. This was the first conference with Edward McMorrow, Chicago, general executive board member of the Amalgamated. Another meeting was set for May 10.

Des Moines Men Seek 70-Cent Rate

Union employees of the Des Moines City Railway, Des Moines, Iowa, have asked the company to submit the question of an increase in wages to a board of arbitration. The agreement governing wages to be paid the men expired on March 1 of this year and the men demand a rate of 70 cents an hour. When Des Moines cars were put back in service in October, 1921, after a shutdown of seven weeks, the men accepted a cut in wages of 7 cents an hour. They now claim that in comparison with other wage scales they are not receiving proper compensation. The agreement between the company and the men provides that questions as to wage scales which cannot be settled otherwise will be submitted to a board of three arbiters, one representing each side and a third chosen by the two others. The men have named their business agent, Ben J. Wiley, as their representative, but no choice has yet been made by the company.

Erie Employees Receive Ten per Cent Increase

The threatened strike by the employees of the Buffalo & Lake Erie Traction Company, Erie, Pa., was recently averted by the amicable settlement of the wage controversy. The company granted a 10 per cent increase, which amounts to 5 cents an hour for the older men. The previous scale in cents per hour was 42, 46 and 50. This has been increased 10 per cent, with the operation of one-man cars paying 5 cents additional. The men had demanded a maximum of 65 cents for two-man cars and 75 cents for one-man cars.

New Jersey Men Seek 30 per Cent Advance

Wage demands which would increase the present pay of platform men, maintenance of way men, shop men and cleaners by 30 per cent have been prepared for presentation to the Public Service Railway, Newark, to become effective at the expiration of the present working agreement between the company and its employees which terminates on Aug. 1.

The wage demands are for the following increases:

First three months, 46 to 61 cents an hour.

Next nine months, 48 to 63 cents an hour.

Thereafter, 50 to 65 cents an hour.

Operators of one-man cars would be raised from 55 to 80 cents an hour.

The demands also include increases for men working as extras, pending the obtaining of a full-time job. These men now get a guarantee of $20 a week. The increase sought is $25, with the working day reduced from thirteen to twelve hours and with a full day's pay for those employed on runs of from six to nine hours.

Embodied in the demands will be a request of the men for one day off a week.

The agreement now in force was entered into by the company and the men on June 22, 1921, following a vote of the men to accept a wage cut of approximately 10 per cent from Aug. 1 of that year. The agreement was to run two years. The new scale meant a 5-cent an hour reduction in the salary of all platform men, their rate at the time being 51 cents an hour for the first three months of service, 53 cents for the next nine months and 55 cents an hour thereafter. Operators of one-man cars received 5 cents an hour extra.

Chicago Surface Men Demand 80-Cent Rate

Negotiations have been opened between Division 241, employees of the Chicago Surface Lines, and Henry A. Blair, president of the company, on demands formulated by the division at a regular meeting held on May 7. The new demands were presented to Mr. Blair on May 10, and negotiations were started immediately. Meetings will be held daily if necessary until an agreement is reached.

Under the new demands the maximum hourly pay would be increased from 70 cents to 80 cents. In addition to the wage increase the men voted to demand one day off duty in every seven and to require the company to discard all one-man cars, which are being placed on outlying lines in increasing numbers by the company.

No strike ballot has been polled, and it is unlikely one will be taken unless negotiations fail.

Although the "L" has received notice from Division 308 regarding the expiration of the present contract, no new demands have been received by that company from the men. Whatever action is taken by the surface men is likely to be followed by the "L" men.

Wage Arbitration in Prospect in Grand Rapids

The employees of the Grand Rapids Railway, Grand Rapids, Mich., are seeking an increase in wages to 60 cents, with 65 cents for operators of one-man cars. The company feels that this is unreasonable. Arbitration appears to be ahead as the only way out. The offer of the company to the men was 48 cents an hour for the first three months served, which is recognized as the apprentice period, and 50 cents an hour thereafter with 55 cents an hour for safety car operators. This scale, the company has explained, was arrived at after a thorough analysis of its financial condition and ability to pay without being compelled to increase the present rate of fare.

L. J. DeLamater, vice-president and general manager of the company, said recently:

> Inasmuch as the majority of our cars will be operated by employees who will receive the 55 cents an hour rate we feel and know that we have offered the very limit without punishing the car riders of the city and under the existing conditions we can only ask, if necessary, for an arbitration of the matter, which we will doubtless do, as provided for in Section 32 of the franchise we are operating under, this being the section that in large part was drafted by the union leaders. Under the existing conditions I am sure our position must be acknowledged as at least fair, if not more than fair.

Three-Day Strike in Lawrence

The strike of the employees of the Eastern Massachusetts Street Railway at Lawrence was settled shortly after 10 p.m. on May 8 when the men voted to return to work in the morning, pending arbitration of the questions in dispute.

The strikers had asked for an increase in wages amounting to 35 per cent, for an eight-hour day instead of a nine-hour day as at present, and the application of the seniority rule to all employees. The road has agreed to arbitrate all these demands, except the application of the seniority rule to the miscellaneous men, and the strikers have accepted this agreement.

The settlement was reached as a result of the mediation of W. H. Mahon, national president of the Amalgamated. The 150 men who went on strike had been declared outlaws by John F. Reardon, local Amalgamated committee man for Massachusetts.

One of the new clauses provides that in case the company decides to operate buses, the same working conditions and agreements will apply to the men on the buses as on the street cars.

Five-Cent Increase for Akron Men

Platform men of the Northern Ohio Traction & Light Company, Akron, Ohio, voted on May 7 to accept an increase of 5 cents an hour. The vote followed an offer of the company, and there was very little objection to accepting. The wage increase makes the new wage scale for trainmen on this system:

City: First year, 48 cents; second year, 50 cents; third year and thereafter 53 cents.

Suburban: First year, 49 cents; second year, 51 cents; third year and thereafter 54 cents.

Interurban: First year, 53 cents; second year, 55 cents; third year and thereafter, 58 cents.

The contract was signed on May 8. It dates from May 1, however.

Fresno Men Receive Increase of Two Cents an Hour

Trainmen of the Fresno Traction Company, Fresno, Calif., received a pay increase of 2 cents an hour effective April 16. The new scale is as follows: First year men, 49 cents an hour; second year men, 50 cents; third year men, 51 cents, and fourth year men, 53 cents an hour. Men operating one-man cars will receive 4 cents an hour in addition to the above scale. The average working day is 9½ hours.

Mayor Against Michigan Measure Defining Joint Operating Rights

The so-called Lee bill was introduced recently into the Michigan State Legislature by Representative Lee. The purpose of the bill is to give the State Public Utilities Commission power to order electric railways to connect their tracks physically for joint use and to confer upon the commission the power to determine the rental to be charged each of two railways for the right to operate over the tracks of the other.

The Mayor of Detroit and Corporation Counsel Wilcox say the bill is the first step in a movement to take away from the city of Detroit the right to control its streets with respect to the operation of the cars of the municipal railway system as provided by the state home rule act.

Mayor Doremus regards the measure as endangering the work of the board of arbitration recently appointed by the Detroit United Railway and the city of Detroit to fix the rentals that the city shall charge the Detroit United Railway for the privilege of operating interurban cars into the city of Detroit over the lines of the municipal railway. This board is reported as practically ready to render its decision.

It is argued in favor of the bill that if Detroit bars the D.U.R. interurban cars from entering the city, the people of Port Huron and other Michigan cities traveling to Detroit by interurban would have to transfer to city cars at the Detroit city limits.

The opposition to the bill points out, on the other hand, that the question of barring the D.U.R. interurbans from the streets of Detroit was voted down by a large majority when the question was recently submitted to a referendum of the people of Detroit.

Canal Abandonment Plans Advance Another Step

The long talked-of scheme of using the bed of the old Morris Canal for a high-speed electric railway line connecting Newark, N. J. and suburban communities, was advanced another step recently when Governor Silzer named five men to the committee which will study the problem.

The men selected by the Governor are C. C. Vermeule, who was for many years topographical and consulting engineer for the State Geological Survey; E. D. Duffield, president of the Prudential Insurance Company; S. P. Leeds of Atlantic City; A. W. Drake of the American Telephone & Telegraph Company, and W. O. Morgan. The latter is well known in the electric railway industry, having been in turn connected with the Greensboro (N. C.) Electric Company, the Sheboygan (Wis.) Railway & Electric Company, the Empire United Railways of Syracuse, N. Y., and the Buffalo, Lockport & Rochester Railway. Other members of the committee are to be selected by various municipalities through which the canal passes.

No definite plans have yet been agreed upon for the use of the canal as an electric line. In a statement made a few days ago T. N. McCarter, president of Public Service Railway, said that his company would be interested in using a portion of the old waterway for rapid transit purposes. The part that would be so used, however, is comparatively short and would have more the character of a subway in the city of Newark than an interurban line.

At the same time the plan to change the location of the Hudson & Manhattan Railroad station in Newark has again been brought forward. It is proposed to extend the railroad underground to a point opposite the Public Service Terminal and establish a direct connection with the lower level of that structure. Many of the passengers desiring to change from the tube trains to street cars would then transfer without going out of doors. The plan now talked of is essentially the same one that was proposed some years ago, but abandoned on account of the war.

London Underground Officials Visit United States

J. C. Mitchell, secretary and treasurer of the London Underground System; A. Rozier, superintendent of rolling stock of the London General Omnibus Company; E. Boys, secretary of the London Suburban Traction Company, and Ivor Fraser, publicity manager of the London Underground System, are on a visit to the United States. They arrived on May 4 on the *Mauretania* and expect to return on the *Aquitania* on June 12.

They plan to study railway problems and transportation by bus, and started on May 9 on a tour of cities in the East and the Middle West which will include in the order named Albany, Montreal, Toronto, Buffalo, Cleveland, Detroit, Chicago, St. Louis, Cincinnati, Pittsburgh, Washington, Baltimore and Philadelphia. They expect to return to New York about May 30 and will then spend a week studying conditions in and around New York.

It is under Mr. Fraser's direction that the excellent work in bettering public relations in London has been done for the so-called Underground group, reference to which has been made many times in the ELECTRIC RAILWAY JOURNAL. This work, it will be recalled, has included the advertising of the lines, one of the most important features of which has been the use of posters reproduced from time to time in these pages. Mr. Fraser's principal object is to learn all that he can in the short time at his disposal about the relations of the railways with the public. He has expressed very keen interest in the work of the State committees on public utility information. The other gentlemen in the party will concentrate on the particular phases of railway work in which they specialize. In speaking of bus operation in London Mr. Fraser said that the remarkable fact was that there seemed to be no limit to the bus patronage. No sooner were additional buses installed than their capacity was almost immediately exceeded. He said there appeared to be no saturation point in sight. On his program is included a stop over at Atlantic City to attend the sessions at the convention of the Associated Advertising Clubs of the World.

News Notes

Ten-Cent Increase for Cedar Rapids Men.—Effective May 1, a wage increase of 10 cents an hour was granted to all employees of the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa. This makes the maximum for men with six months service 50 cents an hour. The increase affects all employees in Cedar Rapids, Marion and Kenwood Park.

Serious Accident on Cuban Road.—Twenty-five persons are reported to have been killed and more than fifty injured in a head-on collision on May 6, between Hershey Electric Railway trains near Camasi, Province of Matanzas. The trains were rounding a curve at high speed when they crashed. Fire started immediately in the wreckage and a number of the victims were burned to death in the blazing coaches.

Tacoma Sued on Account of Municipal Railway.—The United States government has filed suit in the Federal Court at Tacoma, Wash., against the city of Tacoma for $232,398, alleged to be due the United States Shipping Board for extensions and improvements on the Municipal Street Railway during the war. The suit, which is a bill in equity, follows a demand of Mayor A. V. Fawcett that the government either cancel the debt or determine its status in court.

Wage Advance in Sioux City.—Employees of the Sioux City Gas & Electric Company, Sioux City, Iowa, have accepted the proposal of the company for an increase of approximately 7 per cent in wages. The new scale went into effect on May 1. Under the new agreement first-year men receive 45 cents an hour, second-year men 47 cents an hour and third-year men and over 50 cents. This is an increase from the present scale of 42, 44 and 48 cents an hour. The men demanded a 20 per cent increase.

Bill Ousting Commission Killed.—Senate Bill No. 23, introduced by Senator Bender of Cleveland in the General Assembly, calling for the abolition of the State Public Utilities Commission, was, on Mr. Bender's own motion, killed in the Senate utilities committee recently. Not an individual in the entire state of Ohio came to support the bill, while investment bankers, chambers of commerce and other organizations of business men flooded the committee with their protests against it. Consequently Mr. Bender made a motion to postpone the bill indefinitely.

Financial and Corporate

$316,423,557 P. R. T. Value

Figures Revised as of May 1, 1923, Were Submitted to Commission at Hearing on May 4

Valuation proceedings were conducted on May 4 before Commissioner Clement of the Pennsylvania Board. E. D. Booker, of Philadelphia Rapid Transit counsel, conducted the cross-examination of W. K. Myers, vice-president in charge of finance, and A. E. Hibner, valuation engineer.

The company at the same time submitted to the Public Service Commission a new figure on the valuation of its property, bringing the June 30, 1919, valuation up to date in restating that valuation as of May 1, 1923, at $316,423,557.

The company's valuation engineer, A. E. Hibner, testified that he made an investigation of the trend of prices since the June 30, 1919, valuation, and obtained a reproduction cost of the P. R. T. property as of May 1, 1923, including all overheads of $316,423,557.

Mr. Hibner explained the difference between the trend of prices shown by the company's price curve and that prepared by the city's expert, Robert M. Feustel. According to Mr. Hibner, Mr. Feustel's trend is composed largely of the all-commodities index prepared by the U. S. Bureau of Labor, and consequently reflects the abnormally low prices that have prevailed in the last three years for farm products. He explained that the prices of manufactured products such as power plant and substation equipment and cars are not reflected in the all-commodities index. He testified that there were other inaccuracies in the figures of the city's expert, among which was the price of structural steel erected for the first quarter of 1922, which Mr. Feustel based upon a price of $55 per ton. The company's expert explained that this was the price prevailing prior to the war and that he obtained a price of $70 per ton from the books of a large local structural steel fabricator.

The company's valuation engineer also considered as inaccurate the city's trend figure of 52 per cent for lumber, as the price quoted by the Lumbermen's Service Bureau of Philadelphia for the first quarter of 1922 showed that the average price of four sizes of yellow pine lumber was 77 per cent as at June 30, 1919.

The low price used for structural steel erected and for lumber, together with the low rate given to labor, resulted in the city's trend of the cost on buildings being low.

A reappraisal of the company's land by J. A. Patterson, William Levis and Edwin C. Hunter, the company's real estate experts, showed the right-of-way to have a value at May 1, 1923, of $2,326,334 compared with the June 30, 1919, appraisal of $2,021,242, and other land used in electric railway service to have a value of $8,371,458 compared with the June 30, 1919, appraisal of $6,179,074.

On the same day the railway submitted to the commission through its vice-president of finance, W. K. Myers, its budget of estimated financial results from operation for the year 1923 compared with 1922 actual.

The passenger revenue for 1923 is estimated at $44,000,000 as compared with $41,759,000 actual for 1922. This is an increase of 5.37 per cent.

Mr. Myers stated that the estimate of passenger revenue is based on a careful study of statistics relating to the normal annual increase in passengers during the last twenty years, and the general economic condition in the latter part of 1922, as compared with the beginning of the year.

The renewal and depreciation reserve appropriation is stated at $8,560,400. The same sum was appropriated for the years 1921 and 1922. The estimated expenditures for the renewal and depreciation reserve is stated at $8,835,500. The balance in the renewal and depreciation reserve as of Dec. 31, 1922, was $4,737,993; the estimated balance in the reserve at Dec. 31, 1923, is stated at $4,462,893.

In explaining the estimated cost of extensions and betterments for the year 1923, Mr. Myers stated that he only included such construction as the company felt sure would be completed during the year. No estimate was included for the major portion of the crosstown lines, the proposed bus line on Roosevelt Boulevard and Broad Street, the trackless trolley on Oregon Avenue or the Southern carhouse.

Mr. Myers said: "While the company hopes to get started on all of these improvements during the year 1923, we as yet have no definite assurance that we can do so, and for that reason I have not included their estimated costs in this tabulation."

$109,468 Surplus for Toronto

Transportation Commission Makes Public Results of First Sixteen Months of Municipal Operation

H. H. COUZENS, general manager of the Toronto Transportation Commission, on April 17 sent to the board of control and the City Council of Toronto, Ont., a statement of the accounts showing the result of the first sixteen months of the commission's operation of the lines formerly embraced in the system of the Toronto Railway. The period covered is from Sept. 1, 1921, to Dec. 31, 1922. The statement is not intended to be a railway operating report, but was prepared in order to reply to points raised by the City Council.

The gross revenue for the sixteen months of operation amounted to $15,723,482. The expenses of operation, including the cost of electrical energy, totaled $10,968,614, leaving net income of $4,754,867. Interest on and redemption of debt, together with depreciation, absorbed $3,493,610. Reserves for unredeemed tickets, workmen's compensation and public liability were $575,000. Reserves for contingencies were $437,569. Organization expenses were $139,218. Thus there was left a surplus of $109,468 for the period under review.

Passengers Carried and Fares

During the period under review 249,015,476 passengers were carried. The average rate of fare (based on the tickets sold and cash fares), equalled 6.165 cents. Traffic was adversely affected until the fall of 1922 by the rehabilitation work under way, and the consequent disorganization of the service. Since then, however, there has been a marked increased in the number of revenue passengers carried. This is shown by the following figures for the four months ended Dec. 31, 1921, and 1922:

1921	1922	Increase (1922 over 1921)
61,870,213	65,447,506	3,577,293

Mr. Couzens says that this improvement has been maintained to date.

An analysis of the component items of the cost, expressed as fractions of the average fare, is as follows:

	Per Passenger, Cents	Per Cent
Maintenance of trackwork including overhead and buildings	0.290	= 4.62
Maintenance of equipment	0.628	= 10.01
Cost of power	0.602	= 9.61
Conducting transportation (i.e., the expenses of operating the cars), excluding maintenance	2.499	= 39.85
General and miscellaneous expenses	0.386	= 6.15
Interest on and redemption of capital and depreciation	1.403	= 22.38
Reserves	0.406	= 6.49
Organization expenses	0.056	= .89
Total	6.270	= 100

The difference between the total cost of 6.27 cents and the average fare paid per revenue passenger, 6.165 cents, represents the sundry revenue from sources other than those obtained from passengers.

Mr. Couzens explains that before the work of rehabilitation was commenced, it was estimated that at least three years would be required to rehabilitate the property and bring the service to

TORONTO TRANSPORTATION COMMISSION REVENUE ACCOUNT FOR THE SIXTEEN MONTHS ENDED DEC. 31, 1922.

SECTION I—SHOWING NET INCOME FROM OPERATIONS

EXPENDITURE

Cost of electric current including operation and maintenance of substations	$1,499,606
Expenses of operation, maintenance, repairs, administration and taxes, including accrued charges	9,469,009
Net income available for fixed charges, carried to Section II	4,754,867
	$15,723,482

SECTION II—SHOWING DISPOSITION OF NET INCOME

Interest	$2,588,181	
Less: Interest on idle funds	532,506	
		$2,055,676
Redemption of debenture debt (repayment of capital)		425,108
Depreciation		1,012,828
Organization expenses		139,218
Reserve for unredeemed tickets		175,000
Reserve for workmen's compensation and public liability		400,000
Reserve for contingencies		437,569
Net income carried to surplus account		109,468
		$4,754,867

standard, but that while little more than one-half of this period has gone, the progress made has been such that, provided no unforeseen circumstances arise, the work will probably be substantially completed this year.

The principal work done to the end of the year 1922 includes the following:

TRACKWORK

Extensions	40 miles
Total rehabilitation	49 miles
Repaired and welded	31 miles

NEW ROLLING STOCK

The following were delivered as at the end of 1922:

Cars	262
Buses (gasoline)	eight double deck
	three single deck
Trolley buses	four single deck

It is explained that the gasoline and trolley bus services were started partly as an experiment in order to see what the result would be under climatic conditions peculiar to Toronto and in order to give service in districts which could not be properly served by street cars at present. According to Mr. Couzens the results have justified expectations, and "while not in our opinion the most economical and suitable for mass transportation purposes, buses will, we are confident, fill a useful place in the general plan of transportation."

One complete carhouse and yard at Eglington, two large extensions of carhouses and yards, one at St. Clair and the other at Danforth, and one yard extension at Russell have all been constructed.

Mr. Couzens says that pending the conclusion of the hearing of the appeal against the decision of the majority of the arbitrators in the Toronto Railway purchase case it is perhaps not desirable to go into details of the award, but that the amount of the award is very greatly in excess of the value of the assets transferred to the commission for incorporation in the unified system.

In discussing the question of fares Mr. Couzens says that the figures show that the results do not justify a fare reduction. On this point he says in part:

As has been pointed out, the average fare on the system is 6.165 cents per passenger. When considering the question of fares and comparing them with those previously in force, the following obvious facts are often overlooked:

1. The area served by the commission with one fare is practically 35 square miles as against 17 in the case of the Toronto Railway, i.e., more than double the area.

2. Prior to the date when the service was unified, there were four systems operating in the city (each with a separate fare) as follows: Toronto Railway; Toronto & York Radials, three separate divisions, each charging a separate fare; Toronto Civic Railway, four divisions, each charging a separate fare; Toronto Suburban Railway.

Thus a passenger, other than those riding in the central section of the city, was required to pay more than one fare, with the additional inconvenience of transferring from one system to another.

In the case of all of the foregoing, excepting the Toronto Suburban, service is now given at a single fare over the whole of these lines as well as over the extensions laid by the commission. In the case of the Toronto Suburban Railway, however, service in most of the area is given, to a great extent by the commission's buses in West Toronto, and in most of the remaining area by street car lines operated by the commission.

It is, therefore, clear that many passengers today are carried at practically the same rate of fare as formerly, and have a service already substantially improved which will be still further improved when rehabilitation is completed and the new system operating at maximum efficiency.

With a universal fare every extension added to the system increases the cost without a corresponding increase in the revenue, as it means carrying the passengers a greater distance for the same fare. The extensions made were necessary, however, in order to give the service to which car users were already entitled.

An analysis of fares in 607 cities on this continent shows that fares range from 5 to 10 cents. Of this total more than 40 per cent are higher than in Toronto at present, and more than 30 per cent are the same as in Toronto. It will, therefore, be seen that more than 70 per cent of all these cities are paying as high or a higher rate than Toronto, yet in all cases they have the advantage of systems constructed in pre-war days, the majority having the benefit of the much lower cost of materials which obtain at any time in the United States, and at the same time the vast majority paying lower wages than in Toronto.

In some cases with systems constructed at low pre-war prices and paying lower wages, the 5-cent fare is in force. In Toronto, with a large arbitration award, a rebuilding program which had of necessity to be carried out at times when prices are high, a system that cannot be efficiently and economically operated until rehabilitation is completed, it is obvious that a higher fare is necessary.

As a direct illustration Mr. Couzens points to the case of the Montreal Tramways. He says that here is a long-established and well-organized enterprise, operated efficiently, but that the fare is the same as in Toronto, while the trainman's rate of wage in Toronto is 25 per cent higher than in Montreal, and in other grades the difference is even more marked.

In considering these accounts, Mr. Couzens says it must be borne in mind that the figures are of necessity in some particulars approximate only, due to the following:

1. Provision has been made for the amount of the award as issued by the majority of the arbitration board which was formed to determine the price to be paid by the city for the property of the Toronto Railway. There is also included interest on the amount of the award as from Sept. 1, 1921. The city has lodged an appeal, the final outcome of which has not been determined.

2. The figures included in the cost of electrical energy are tentative, as the accounts are subject to review based on the cost of power supplied by the Hydro-Electric Power Commission of Ontario through the Toronto-Niagara Power Company and the Toronto Hydro-Electric System.

3. The figures are not yet available covering the operation of the city section of the Metropolitan Division of the Toronto & York Radials from the date on which the "Clean-up Deal" became effective, to the time when the T. T. C. commenced to operate from Farnham Avenue to the North City limits on Yonge Street.

The provision for depreciation cannot be finally determined pending the settlement of the appeal in connection with the arbitrators' award. After the amount of the award is finally settled, the same must be divided into sub-totals covering the various groups of assets which have different years of useful life.

There are other items yet to be adjusted which are correlated and cannot yet be finally determined.

With respect to these matters Mr. Couzens says that in the interest of sound finance adequate provision has been made in the accounts to cover all reasonable contingencies in respect to the matters still subject to possible adjustment.

Injunction Invoked in St. John

The New Brunswick Power Company is seeking an injunction against the building of a competitive power distribution system in St. John. According to the *Financial Post*, Toronto, E. N. Sanderson has presented a new offer to the City Council to sell the common stock of the company to the city for $305,000. This offer was summarily refused.

Despite the fact that two of the city commissioners admit the building of a duplicate system is unwise, preparations for the construction of the system have been resumed. The Mayor says he has a mandate from the people to go through with the construction of the duplicate power distribution system.

Mr. Sanderson, who is president of the Federal Light & Traction Company, has offered to distribute the hydro-electric current from the Musquash provincial station for two years at stipulated rates. This offer, like over a dozen others, has been rejected.

Oakland Terminal Lines to Be Sold

On application of the Mercantile Trust Company and the Union Trust Company, San Francisco, Calif., Judge James G. Quinn at Oakland has entered a decree of foreclosure against the San Francisco-Oakland Terminal Railways and has appointed Joseph P. Lanktree, 500 Broadway, Oakland, commissioner to conduct the sale of the properties. The trust companies were acting in behalf of the holders of securities of the company on which interest has been in default since 1919. It is expected that the properties will be bought in by the representatives of the committee of the bondholders.

Critical Period Ahead

San Francisco Non-Partisan Citizens' Agency Concerned for Future Municipal Railway

In the analysis of the finances of the San Francisco Municipal Railway, the San Francisco bureau of governmental research in its monthly publication, the *City*, said in the January, 1922, issue that "the critical period in Municipal Railway affairs is to come, with the supervisors contemplating, and committed in part to, a $1,600,000 expenditure program out of the depreciation fund, which will leave nothing for depreciation purposes."

$2,115,000 OF WORK ORDERED

Since that time various extensions and construction work, as well as bus lines, have been recommended, and the supervisors have ordered work requiring an expenditure of at least $2,115,000.

An analysis published in the February, 1923, issue of the *City* contains the following:

The capital expenditures involved in the extensions the supervisors have embarked upon, including equipment, total $1,165,000. An additional $200,000 is required immediately, according to the city engineer, for an addition to the Potrero barn, and for the city's share of track repairs on lower Market Street. Further, the city engineer states that an additional $750,000 must be provided for a shop and barn, including land for same, if the Sunset and Ocean View extensions are built and operated.

The total unencumbered balance in the depreciation fund to cover these proposed expenditures, which total $2,115,000, is $1,105,000. Although the gross set aside in the depreciation fund is averaging $45,000 per month, or $540,000 per year, the future net accumulation to the fund will probably not exceed $290,000 per year. Taking account of the $1,000,000 minimum depreciation reserve recommended by the city engineer, the program embarked upon by the board is approximately $2,009,000 in excess of the present available depreciation fund balance.

In the opinion of the bureau the depreciation reserve is being erroneously considered, first, as a gross amount set aside instead of the net amount actually available, and, second, as a surplus fund available for expenditures for any desirable project. The depreciation fund is not a surplus fund, and was purposely set apart from surplus funds to avoid this very confusion. The surpluses from operations, which have totaled over $2,900,000 for the period 1913-1922 inclusive, have practically all been expended, approximately $1,560,000 of such expenditures being for additions and betterments and advances to the city's general fund on account of Twin Peaks and Stockton Street tunnel costs.

A proper charge to cover depreciation is in exactly the same category as any operating charge. Expenditures required for depreciation, however, are cumulative and deferred; the replacement and renewals to offset depreciation and obsolescence are not required until original units of plant or equipment reach the end of their economical service. When such time comes the burden of replacement or renewal is usually too great to be borne out of the then current operating revenues of the property; if the funds have not been set aside as the depreciation has accrued, it may be difficult and costly, or even impossible, to provide such funds.

Following publication of the annual report of the Municipal Railway for the year ended June 30, 1922 (abstracted in ELECTRIC RAILWAY JOURNAL, March 3, 1923, page 384) the *City* contained further reference to the subject of depreciation:

The depreciation reserve is also of interest, from the standpoint of continued financial integrity of the system. The $1,603,000 reserve as of June 30 was probably no larger than actually required for accrued depreciation of the property. As shown by the income account, a gross of $3,463,774 (18 per cent of gross revenues) has been set up in the depreciation reserve since the start of operations in 1912. The disposition of this amount is not shown in the printed financial statement, but it is estimated, using approximations, that $1,100,000 has been used for bond redemption, $250,000 for accident claims, $450,000 for wage increases and $210,000, net, for additions, betterments, advances, etc. The June 30 balance has been reduced, as of Jan. 31, to less than $1,150,000; the next balance sheet will record an important shrinkage in this item.

The statements show that all surpluses of the earlier profitable years have been expended, and that part of the depreciation reserve has been diverted to operating and additions. The universal policy of retaining part of surplus as "insurance" against future emergencies and losing years has not been followed. On the other hand, with the surpluses expended, there is a continually strong pressure to disburse the balances remaining in the depreciation reserve for additional extensions.

First Surplus Since Service-at-Cost Became Effective

The growth of population and general business development are reflected in the annual report of the Memphis (Tenn.) Street Railway for 1922, just turned over to Commissioner Horace Johnson by T. H. Tutwiler, receiver. For the first time since the company has been operating on its cost-of-service plan, approved by the Public Utilities Commission, its report shows a surplus for the past year above cost of operation and the 6½ per cent allowed the stockholders on their investment. The surplus amounted to $63,675 and cut the deficit of $200,771, piled up prior to January, 1922, to $137,096.

The entire revenue of the company from all sources amounted to $3,153,195. The cost of service during this time was $3,098,519. This included the expenditures for maintenance, operation, taxes, renewal and reserve fund, a return of $786,707 to the stockholders and $12,751 interest on the deficit. There were 44,481,903 passengers on all cars of the company during the past year, and a total of 7,618,914 car-miles were traversed.

Auction Sales in New York.—At the public auction rooms in New York on May 9 the following electric railway securities were sold: 202 shares Nova Scotia Tramways & Power Company, Ltd., ordinary shares, $15 per share; $5,000 Cleveland, Elyria & Western Railway extended 7 per cent certificates, 64⅜ per cent.

Another Brooklyn City Dividend.—The board of directors of the Brooklyn City Railroad on May 8 declared a regular quarterly dividend of 20 cents a share on the outstanding capital stock, payable on June 1, to stockholders of record at the close of business on May 19, 1923.

Road Sold to Representative of First Mortgage Bondholders.—The property of the Montgomery Transit Company has been sold to Nicholas Larzelere, Norristown, Pa., attorney for the bondholders, for $150,000, the amount of the first bond issue, of which the Norristown Trust Company is trustee. The sale was decreed on foreclosure proceedings. The line reaches Norristown by agreement with the Reading Traction Company, Reading, Pa. The road is about 12 miles long.

Debenture Bonds Offered.—Stroud & Company, Inc., Otis & Company, Howe, Snow & Bertles, Inc., and R. E. Wilsey & Company are offering a new issue of $1,500,000 Tide Water Power Company, Wilmington, N. C., fifteen-year 7 per cent sinking fund gold debenture bonds due Oct. 1, 1937, at 97 and interest to yield over 7.30 per cent. The bonds are redeemable as a whole or in part at the option of the company on six weeks' notice up to and including Oct. 1, 1927, at 110 and accrued interest, the redemption price decreasing 1 per cent for each year thereafter. Earnings available for interest charges on the debenture bonds for the year ended June 30, 1922, were equal to over 3.8 times the annual requirements.

Receivership Said to Be Ahead of Interurban.—A receivership is threatened for the Oregon Electric Railway, operating into the heart of the Willamette Valley from Portland, Ore., because of the apparent inability of the company to meet the interest due on $2,000,000 of bonds. The company has sixty days grace, but no promise of payment has been made. W. E. Turner, president, states that the company is unable to pay the interest because of the unsatisfactory financial condition of the road. The interest is a semi-annual payment of $50,000. The plight of the road is directly traceable, it is claimed, to the competition of buses and automobile trucks and to the privately owned automobiles in use on the main-traveled highways of the county. The company recently placed in effect reduced fares, making the round-trip tickets from Portland to Salem 50 cents lower than heretofore. Even this reduction has failed materially to stimulate traffic.

Little Rock Bonds on 6.45 Per Cent Basis.—Harris, Forbes & Company, Bonbright & Company and Tucker, Anthony & Company, New York, N. Y., are offering at 94½ and interest, yielding about 6.45 per cent, $2,500,000 of Arkansas Central Power Company first lien and refunding mortgage gold bonds, due 1948. Issuance of the securities is subject to authorization by the Arkansas Railroad Commission. As stated in the ELECTRIC RAILWAY JOURNAL for May 5 the Arkansas Central Power Company, incorporated in April, 1923, has taken over the physical property formerly owned by Little Rock Railway & Electric Company, and now does the entire commercial electric power and light and street railway business in Little Rock, Ark., also providing all electricity commercially distributed, directly and indirectly, in North Little Rock. The bankers explain that the railway system has for many years produced substantial profits, but that the electric power and light business is steadily increasing, the relative importance of the latter being shown by the fact that more than two-thirds of the net earnings for the twelve months ended Feb. 28, 1923, were derived from the sale of electricity.

Traffic and Transportation

Sorry Situation in Youngstown

Street Railway Commissioner So Describes Failure of Public to Respond to New Fare Plan

Harry Engle, street railway commissioner at Youngstown, Ohio, is visibly disappointed at the way things have been going in Youngstown since the sale of the weekly pass was discontinued. The change in fares has not had the stimulating effect on traffic which Mr. Engle anticipated. He wants the public to have the facts so that "they will not be surprised when it shortly becomes necessary to inaugurate a higher rate of fare."

It will be recalled that the sale of the weekly pass good over the lines of the Youngstown Municipal Railway was discontinued on April 1. The new rate of fare adopted for a trial period was 7 cents cash, three tickets for 20 cents, and 1 cent for a transfer. The rate previously in effect was 9 cents cash, six tickets for 50 cents, 1 cent for a transfer and an unlimited ride weekly pass for $1.25.

According to Mr. Engle's estimate the operation of the line in April will show a net deficit of $28,000. He sees an 8-cent fare ahead. Mr. Engle's lament at the way things are going is, perhaps, best expressed in his own words. In a letter to the Council on May 2 he said:

> You will recall that the present fare scheme was adopted on the basis of an eight weeks' trial. Without figuring too closely I have rather assumed that it was a two months' trial, involving the months of April and May. You will further recall that the resolution adopting the present fare scheme provided that if it were not successful, the company at the end of the trial period should have the right to adopt a new rate of fare, to wit: seven tickets for 50 cents, 8 cents cash and 1 cent for a transfer.
>
> Detailed figures for the operation during April will not be available for many days, but it is now possible to make an estimate of the situation which will be quite accurate. My estimate of the gross earnings for the month of April is $129,000. My estimate of the total car-miles operated for the month is 392,760, and on the basis of an operating cost of 40 cents a mile, it is reasonable to assume that the total cost of the operation of the property for the month of April will be about $157,100. It thus appears that the operation of the cars during April will show a net deficit of about $28,000.
>
> I am very sorry that people generally have not more thoroughly appreciated the reduction of car fare which was provided for them. We all know that the new rate of fare was a reduction and that the application of this fare would have a tendency to decrease our income, but I also know that we all felt that the reduction of fare to our car riders would have the happy effect of stimulating the car riding habit to a point where an increased number of patrons would make up for the decrease in the revenue.
>
> It thus becomes readily apparent that the present fare scheme is not a success and it is inevitable, therefore, that an increase of car fare will follow on June 1. This is a very sorry situation, but the people are bringing it upon themselves. If people will not take advantage of the service which we are providing for them, it can have no other effect than that of increasing the car fare for those who ride on the cars.
>
> I shall bring this situation to the attention of Council on next Monday night, but I thought the members of your committee should be apprised of the situation first. Further, I am sincerely of the opinion that the public should be told the facts of the situation, so that they will not be surprised when it shortly becomes necessary to inaugurate a higher rate of fare.

At the Council meeting on May 8 consideration of the matter was put over.

De Luxe Bus Service Started in Milwaukee

De luxe motor bus service was started in Milwaukee, Wis., on May 2 by the Wisconsin Motor Bus Lines, a subsidiary of the Milwaukee Electric Railway & Light Company. The company placed in operation on that date ten twenty-five-passenger, single-deck, type "J" Fifth Avenue coaches and one fifty-two-passenger, double-deck, type "L" Fifth Avenue coach. Announcement was made at the same time that nine additional double-deck buses now on order with the Fifth Avenue Coach Company are expected very shortly and will be placed in service as quickly as received, replacing or supplementing the single-deck buses. The route chosen follows some of the finest streets in Milwaukee, tapping the exclusive east and west side residential districts and passing along Lake Michigan and through the downtown business district.

Montreal to Study Service Improvement

The Montreal Tramways Commission has instituted studies of ways and means to meet the traffic revival which has taken place in Montreal during recent months. J. Rowland Bibbins, consulting engineer, Washington, D. C., has been retained by the commission to supervise these studies and subsequently to recommend proposed plans of service betterment.

Montreal is moving rapidly into a city of the million-population class with relatively short haul, resulting from dense settlement. While the riding habit had temporarily declined, it is again on the increase in spite of the increasing use of automobiles, which have multiplied five times in six years.

The plan of the city has tended to heavy traffic concentration on a few main streets, most of them narrow, with the result that, for a city of this size, the transit system is operating with unusual density and concentration of loading. Moreover, Montreal has to struggle in winter with excessive snowfall and in summer with a great volume of transient motor traffic during the vacation months. These circumstances have produced traffic conditions of growing severity, requiring more effective methods of relief in the future.

Eight-Cent Fare Asked

Buffalo Company Sees Increase as Only Way Out of Present Intolerable Condition

The International Railway, Buffalo, N. Y., has applied to the Public Service Commission for permission to increase its rate of fare on the city lines from 7 cents, or four tokens for 25 cents, to 8 cents, or four tokens for 30 cents. In a letter addressed to the City Council Herbert G. Tulley, president of the company, explains that the increase has been made necessary because of losses totalling more than $5,000,000 sustained since the start of the strike of platform employees on June 1, 1922.

President Tulley says that the strike would not have occurred except for the assurance given to the men by Mayor Frank X. Schwab that they would win. Even at the present time the company is suffering a loss in gross revenues at the rate of more than $1,700,000 a year. The earnings thus lost would, if enjoyed by the company, be available to carry out paving desired by the municipal authorities.

It is pointed out that the International now pays 3 per cent of its gross earnings to the city of Buffalo for the right to carry passengers. Mr. Tulley charges that the Mayor continues to permit the illegal operation of jitneys, which, through the resulting loss in the company's gross earnings, decrease the city's own revenues more than $50,000 a year. Mr. Tulley says:

> The International has endeavored to cooperate to meet the city's service-at-cost views, but since the necessary legislation was not obtained, and the city still encourages jitney competition, the company, to avoid decreasing the service to a point of inconveniencing the public, is obliged to appeal to the Public Service Commission for relief.

Henry W. Killeen of counsel for the International said that the 8-cent fare asked by the company will be made part of the present fare proceedings now before the State Public Service Commission. The City Council already has petitioned the commission for the restoration of the 5-cent fare in Buffalo and in connection with these proceedings the commission has been taking testimony at a series of hearings in Buffalo on the value of the physical properties of the International. The company places a valuation of $96,000,000 on its properties within the city of Buffalo.

Competitive Bus Routes Not Permitted

Applications for certificates of convenience and necessity for the operation of bus lines in the city of Buffalo, N. Y., have been denied by the Public Service Commission. The applications denied were those made by the Buffalo Jitney Owners' Association, the Motor Bus Drivers' Union and Ernest K. Jaggard. In its decision denying the applications for permits to operate buses in Buffalo, the commission holds that all the twenty-one lines or routes, if operated,

would be in competition with existing lines of the International Railway. Under such conditions, the commission says it cannot grant the necessary certificates.

"The principal purpose of the Legislature in requiring certificates of public convenience and necessity was to prevent just such ruinous competition as would exist in this case," says the report of the commission. The memorandum then cites various decisions to substantiate this view.

It also is set forth in the report of the commission that the petitioners "have no funds with which to finance the enterprise and have no definite plans for procuring such funds."

Railway to Seek Bus Rights at Once

Early action is planned by the New York State Railways in the matter of the installation of an auxiliary bus line to tap recently built-up sections on Rochester's west side. After a recent inspection of the proposed route by railway and city officials and residents of the section through which the line will run, the railway announced its intention to apply to the City Council on May 8 for permission to operate.

The tentative route extends from Genesee Street through Genesee Park Boulevard to Chili Avenue to Garfield Street to West Avenue, there connecting with the Main Street West car line. An extension of this line from West Avenue through the new subway to Gates Center via the Buffalo road is under consideration. Application for permission to proceed with this extension will be made to the Gates Center town authorities when the route is finally decided upon.

Four or five buses will be required for the proposed line, according to James F. Hamilton, president of the railway. All bus operations of the company will be conducted by the Rochester Co-ordinated Bus Lines, Inc., a recently organized subsidiary.

The Common Council is expected to act favorably upon the grant of an ordinance for Dewey Avenue bus operations by the company when the matter comes up. No opposition to the plan was expressed at a recent hearing. This line is an extension of the Dewey Avenue trolley line and will operate to Britton Road in the town of Greece. The town board has already granted the necessary permission. A future extension of the line to Latta Road in Greece is planned, the railway already having a franchise for this extension.

The current fare, 7 cents cash or 6½ cents by ticket, with transfers to trolleys, will be charged within the city limits. Outside the city a 3-cent fare will be in effect.

The bus lines contemplated by the company are part of the railway's plan to provide adequate service for the rapidly growing residential sections of the city and suburbs by the use of buses as an adjunct to its railway service.

Weekly Pass Used to Welcome Shriners at Washington

One of the features of the safety-paper weekly passes of the Washington-Virginia Railway is the use of a different timely symbol surprinted on the face in red. The Shriners' convention to be held at Washington in June, therefore, enables the railway to pay a compliment to the visitors by printing their famous star and crescent on the pass which will be valid during the week of June 4-June 10. The back of the pass will also be used to advantage for a statement of some of the many famous places along the lines of the Washington-Virginia Railway. The pass is sold at $1.60, which is the cost of only four round trips between Washington and Alexandria. In consequence the pass will be a good proposition for almost any visitor who wishes to take several trips on the Mount Vernon division and then transfer his privilege to someone else.

Residents Must Accept Consequences of Abandonment

Communities where the residents desert the interurban railways and patronize motor buses to such an extent that the interurban is operated at a loss need not appeal to Ohio courts to compel the electric line to continue operating at a loss. It will do them no good. Chief Justice C. T. Marshall of the Ohio Supreme Court so ruled in an opinion handed down on May 3. This opinion was shared by six of the seven other judges, who voted to uphold the Public Utilities Commission in refusing to order the receiver of the Indiana, Columbus & Eastern Traction Company to continue operation of cars over a 12-mile stretch between Columbus and Grove City.

Another Railway Wants to Substitute Buses

The Pennsylvania-Ohio Electric Company wants to discontinue railway service in Mahoningtown and substitute a bus line in its place. To this end it has made a proposition to the Mayor and the City Council.

For several years one of the chief matters of discussion between the company and the Council has been the service to the important industrial district of New Castle known as Mahoningtown. This is the heaviest traffic line in New Castle, but service has been indifferent due in a large part to the condition of the tracks and to the large number of railroad crossings on the line. In fact, the condition of the track on Cedar Street is such that it will have to be renewed if railway service is to be continued. This renewal will cost in excess of $50,000. The company points out that manifestly it would be undesirable to expend this sum in renewing the track and paving on Cedar Street, practically all of which amount would be a direct maintenance charge against the operation of the line, unless it was decided permanently to continue service to Mahoningtown with street cars. It is further pointed out that even after such improvements have been made the delays to traffic now encountered at the railroad crossings will in no way be lessened.

In his plea to the Mayor and the Council to substitute buses for the trolley cars R. N. Graham, manager of railways of the company, said:

> Within the past few years the modern city bus has been developed to such an extent that it is a comfortable, speedy and dependable means of traffic. At the present time this company is operating four motor bus lines in the city of Youngstown, and I am perfectly safe in stating that this operation is giving the greatest satisfaction to the public and furnishes comfortable, speedy and convenient transportation to the different sections of the city which the buses serve.

Six-Cent Fare Privilege Extended.—Mayor Ainslie of Richmond, Va., has approved the ordinance passed previously by the City Council to extend the 6-cent fare privileges to the Virginia Railway & Power Company for a period of six months. The company has filed its official acceptance of the terms of the ordinance. The extension was granted upon the contingency of a settlement being reached between the city and the company upon the question of a blanket franchise. Within a month, it is believed, City Attorney Cannon will be prepared to advise the committee as to the rights and privileges of both the city and the company in the settlement of the problem.

Agreement Reached on Providence Loop Plan.—An eight-loop plan cutting all crosstown railway lines and looping them at Dorrance Street has been agreed upon by the members of the joint standing committee on railroads and representatives of the United Electric Railways, Providence, R. I. No definite time was fixed for the new arrangement to become effective, but it will be put into operation as soon as possible. Under the plan, all fares can be collected from the passenger upon entering the car on inbound trips and upon leaving the car on outbound runs. This particular feature, it is hoped, will greatly decrease delays in car traffic downtown.

Hattiesburg Joins Weekly Pass Brigade. — The Hattiesburg Traction Company, Hattiesburg, Miss., a Cities Service property, has joined the users of the unlimited-ride weekly pass. This makes almost twoscore weekly pass installations. The pass was started on April 23 at $1 against a one-zone fare of 5 cents and a two-zone fare of 8½ cents ticket and 10 cents cash. In addition to this encouragement to greater patronage, D. E. Byerly, general manager, advises that the rail is to be relaid on two lines and that the rolling stock will be spruced up to make the ride-selling campaign as effective as possible. The local press gave the plan a liberal send-off. Arrangements are also being made for co-operative publicity by merchants and railway. The pass was installed following an analysis of conditions by Walter Jackson.

Book Reviews

Engineering Economics—First Principles

By J. C. L. Fish, Professor of Railroad Engineering, Stanford University. Second Edition. McGraw-Hill Book Company, Inc., New York, N. Y.

Graduates of engineering colleges are criticised for their lack of knowledge of the economic side of their profession. There is warrant for this criticism, but not as much as formerly, because the technical schools, realizing the lack, have been improving their courses to include financial considerations. The field being comparatively new, the literature of economics with special relation to the need of engineering students is only in process of development. Here is where Professor Fish's book fits in, although this does not imply that its field is limited to the technical school. It would do no practicing engineer any harm to review the subject by reading this interesting, comprehensive and original book.

The above three adjectives have been chosen to characterize "Engineering Economics" for the following reasons: The treatment is interesting because it is logical, it relates its statements with illustrations drawn from the every-day life of the engineer, and its style is crisp and clear. In other words, the author leaves no doubt in the reader's mind as to what he intended to say.

The comprehensiveness of the text is suggested by the following partial list of topics: Analysis of problem of investment; interest; practical analysis of first cost; business units; business statistics; valuation; errors in estimating, and engineering reports. Supplementing the regular chapters are appendixes containing such things as sample articles of incorporation, tables of formulas and values for use in economic computation, questions and problems, and an extensive bibliography, sufficient to keep a studious engineer busy for a lifetime.

From the standpoint of originality, this book is striking in its typographical make-up, different type faces being used to emphasize the definitions, illustrations, etc. Paragraphs are numbered so as to indicate the chapters in which they occur and the order in those chapters. For example, paragraph 1321 is the twenty-first paragraph in chapter 13. Similarly figures are numbered to correspond with the paragraphs in which they occur, and the order in which they occur in those paragraphs. For example, Fig. 1324b is the second figure given to illustrate Par. 1324. Formulas are numbered like figures, but the numbers are placed in parentheses to the right of the formulas.

Although the present book is a second edition, it is virtually a new work, based on the discovery, by the author, that the fundamental problem of engineering economics is choice of investment, and not choice of structure as he assumed in writing the earlier book. Starting, therefore, with the problem of the capitalist, large or small, who desires to place his money to the best advantage, the author shows step by step how all engineering economics is an application of sound investment principles.

Thermal Stresses in Steel Car Wheels

Technological Paper No. 235, United States Bureau of Standards. Copies obtainable from Superintendent of Documents, Government Printing Office, Washington, D. C.

An investigation of the stresses induced in steel car wheels from heating the tread has been carried out at the Bureau of Standards in a manner approximating severe service conditions. A large number of rolled, forged and cast steel wheels both new and worn were tested. In the tests the wheels were mounted on a hollow water-cooled axle and the treads were heated by passing an electric current through a soft steel resistor which encircled the wheels. The results of the investigation show how the wheels are deformed from high tread temperature, giving the magnitude and distribution of stresses throughout the wheels. The new data can be used to advantage in considering the question of proposed changes of design and manufacturing practice.

Preparation, Transportation and Combustion of Powdered Coal

Bulletin 217, Bureau of Mines. By John Blizard. Published through the courtesy of the Canadian Department of Mines by the United States Bureau of Mines, Washington, D. C.

The interest in the burning of pulverized fuel in power plants is of recent development, although it can hardly be said of recent origin. For the past two or three years, however, rapid progress has been made until today the subject is one of foremost importance in the power-plant design field. Mr. Blizard's treatise comes along just in time to be of great assistance in this field. It is as nearly up-to-date a compilation of present practice as could be expected, although if written today it would make a still more impressive showing for this method of firing boilers. It contains more than 125 pages of illustrations and text, mostly descriptive, and is fully indexed.

Year Book of American Engineering Standards Committee for 1923

Published by the committee, 29 West Thirty-ninth Street, New York City.

The 1923 year book of the A.E.S.C. points out that there are 205 national bodies co-operating in its work through officially accredited representatives. The number of national organizations on the main committee is now thirty-three. On sectional committees there are 917 individuals serving. The dues paid by the members of the main committee are not sufficient to support its work, and a new plan of sustaining memberships has been worked out. A total of 121 projects now have an official status before the committee, in twenty-six of which the American Electric Railway Association is co-operating.

The year book contains a detailed statement of the work of the committee to date, an outline of its purpose, organization, method of work, etc.; lists of the standards approved during 1922 and before the committee on Jan. 1, 1923 (forty-five in number); the constitution of the committee; a complete list of the standardization projects cross-indexed so as to indicate the co-operating organizations; a financial statement, and other items of interest.

Rate Making for Public Utilities

By Lamar Lyndon. McGraw-Hill Book Company, Inc., New York, N. Y. 201 pages.

This latest addition to the literature on rate making was written, according to the author, because none of the works published "seems to cover certain essential features, nor are the present treatises adapted for the reading of engineers, municipal authorities, bankers and business men, generally, who desire to be informed on this subject." These works only state that because of the opposing decisions of courts and commissions, "a conclusion is hardly to be reached on any but a few of the questions involved."

This book appears to give the author's interpretation of certain of the mooted questions of valuation. Many of his statements indicate unfamiliarity with ordinary financial practices. Operating and fixed charges frequently are confused in the text. The author favors original cost as a basis of value, in preference to the cost of reproduction. In the course of the text, several citations are given from commission and other decisions, none of which, however, is recent, nearly all being more than ten years old.

The treatment of depreciation, in general, is good, and is substantially in agreement with recent opinion. Many readers will disagree with the chapter on "Intangibles," as the author favors elimination of some items included in ordinary valuation work. In sharp contrast with the remainder of the book, which in general takes the non-utility point of view, is the theory advanced by the author of allowing the utility to capitalize operating losses. This is not confined to early losses during the building up of business, but advocates continuing this capitalization in all years when a profit is not earned.

Little space is given to the actual problems of rate making, and the few examples included are not conclusive. There is no general discussion of the various theories advanced for rate making.

While, for the sake of noting a different viewpoint, this book may be worth the reading by the experienced engineer or lawyer who is familiar with utility valuation and rate making problems, it lends itself but poorly to its stated purpose of informing the layman on these questions.

Personal Items

New International Vice-President

Mr. Mack Has Worked Up from Ranks —Oldest Official in Point of Years of Service

H. L. Mack, who has been elected vice-president in charge of engineering of the International Railway, Buffalo, N. Y., and a director of the company, has been associated with traction lines in Buffalo since 1890. The position to which Mr. Mack has been elected is a new one with the company. He will make his headquarters in the Littell Building, Buffalo.

Mr. Mack was born in Lawrenceburg, Ind., in 1865. He received his education in a rural school. His first job on a railroad was with the Big Four in 1881 as a section worker. A year later he held a similar position with the Cincinnati Southern. From 1888 to 1889 he was a lineman for the Western Union Telegraph Company on the Big Four. He next served with the Bell Telephone Company, Cincinnati, in a similar position from 1889 to 1890.

In 1890 Mr. Mack became a lineman for the Cincinnati (Ohio) Street Railway in charge of a line wagon. He held that position for two years, when he went to Buffalo to work for the old Buffalo Street Railway, which was taken over by the International Railway. Mr. Mack's first position with the traction lines in Buffalo was in charge of repair and maintenance of overhead lines.

Two years after entering the service of the company at Buffalo the maintenance and construction departments were consolidated, and Mr. Mack was made supervisor of the merged departments, which included conduits, cables, etc. In 1910 Mr. Mack had his jurisdiction extended to cover tracks and line and he has held that position ever since. With his promotion to the position of vice-president in charge of engineering, Mr. Mack will have complete supervision over all mechanical and electrical departments. In 1915 he took over the bridge and building departments.

During the thirty-three years that Mr. Mack has been associated with the traction lines in Buffalo, he has had a large part in the work of electrifying all the local and interurban lines of the company. When he went to Buffalo there were fewer than 90 miles of lines operated by electricity. Horse cars were still in use on the rest of the system. Now the International Railway has more than 475 miles of electrified lines. Mr. Mack had complete supervision over the construction of the new Buffalo-Niagara Falls high-speed interurban line and other building projects of the International Railway, including the new substation in North Division Street.



W. F. McDanel

W. F. McDanel Succeeds D. D. McMahon with Beaver Valley Company

W. F. McDanel has been appointed cashier of the Beaver Valley Traction Company, New Brighton, Pa., to succeed D. D. McMahon, resigned. Mr. McDanel was born in 1897 at New Brighton, Pa. He was graduated from the New Brighton public schools and then entered Washington & Jefferson College in 1916. He left college and enlisted in the United States Army Air Service in 1918, and served until January, 1919, when he was honorably discharged as lieutenant. From 1919 until November, 1920, he served in the traffic department of the Pittsburgh Railways. He was then employed as assistant dispatcher by the Beaver Valley Traction Company, in which position he served until May 1 of this year.

Mr. McMahon was born in Birkenhead, England, on April 23, 1890. He was educated at St. Wilfrid's College, North Staffordshire. Mr. McMahon entered the service of Lever Brothers, Port Sunlight, England, in 1918 as a clerk. He came to America in 1909. His first work for the Beaver Valley Traction Company was as a conductor. In 1911 he was promoted to cashier, in which position he served until 1915, when he was granted leave of absence to join the British army, which service he entered as a private. At the time of his discharge in 1920 he had been promoted to Captain of Infantry. Mr. McMahon was wounded twice during his term of service; the first wound, which was due to a piece of shell lodging in his neck, invalided him for more than ten months. In 1920 he resumed his duties with the Beaver Valley Traction Company, but resigned on May 1, 1923, to accept a position as outdoor supervisor for the Liverpool & North Wales Steamship Company, Liverpool, England.



D. D. McMahon

Alabama Public Service Commission Appoints Engineers

Announcement has been made of the signing of a contract, with the approval of Governor William W. Brandon of Alabama whereby I. F. McDonnell, consulting engineer for the Alabama Public Service Commission for several years, and C. VanDenberg, principal assistant to Mr. McDonnell, will devote their entire time to the work of the commission. The commission has announced the appointment of Conrad H. Ohme of Birmingham as inspector and supervisor attached to the department of engineering. Mr. Ohme has had wide experience as an engineer, having been engaged in civil, mining and supervising engineering for many years. He has devoted much time, it is stated, to the construction of water works, sewer systems and power plants, also streets and municipal public service plants. Among others he supervised the construction of the power dam for the Tallassee cotton mills.

Rawson Collier Joins Dwight P. Robinson & Company Staff

Rawson Collier, until recently general sales manager of the Central Hudson Gas & Electric Company, Poughkeepsie, N. Y., has joined the organization of Dwight P. Robinson & Company, Inc., engineers and constructors, of New York.

Mr. Collier was for five years a member of the firm of Collier & Brown, consulting engineers, Atlanta, leaving this firm to become connected with the Georgia Railway & Electric Company. Here his work covered sixteen years, during which time he was connected with practically every department in the company. At the time of leaving he was general sales manager of the company. Mr. Collier was graduated from the Massachusetts Institute of Technology.

E. J. Nash is now acting superintendent and purchasing agent of the Butte (Mont.) Electric Railway. J. S. Wathey was formerly superintendent and purchasing agent.

Mr. Burke Made Manager at Keokuk

Walter H. Burke has been appointed to the position of manager of the Keokuk Electric Company, which does the railway, light and power and gas business in Keokuk, Iowa. The Keokuk company is under the general management of Stone & Webster, Inc., Boston, Mass., and Mr. Burke has been located in the home office of that organization for several years in connection with matters pertaining to the southwestern group of companies under Stone & Webster management.

Mr. Burke was graduated from the University of Maine with the class of 1906 and entered the employ of the General Electric Company. Following his service with that company, he held various operating positions as assistant to the manager of the street railway and light and power property at Dallas, Tex., and assistant general superintendent of light and power of the



W. H. Burke

Milwaukee Electric Railway & Light Company.

Mr. Burke is a member of the American Electric Railway Association and is active in the affairs of that association. He is also a member of the New England Street Railway Club and various other clubs, and has been a frequent contributor to the technical press, particularly on subjects pertaining to economic phases of the public utility industry.

H. B. Terrell succeeds W. E. Casey as claim agent of the Southwestern Gas & Electric Company, Texarkana, Ark.

T. P. Pinckard, who recently succeeded G. R. Cottrelle as president of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., has long been engaged in engineering and utility activities. He joined the forces of the Westinghouse Electric & Manufacturing Company in 1905 at its Baltimore sales office after completing the apprenticeship course at East Pittsburgh. In 1907 he secured a transfer to the Kansas City sales office of the company. Three years later he severed connections with the Westinghouse Company and became sales manager of the Peoria Gas & Electric Company, Peoria, Ill. Prior to assuming the presidency of the Windsor, Essex & Lake Shore Rapid Railway he was associated with the Burling Engineering & Construction Company, New York City, Windsor Gas Company and the Dominion Traction & Lighting Company.

Judge Parsons Appointed to New York Commission

Governor Smith shortly before the adjournment of the New York State Legislature transmitted to the Senate the nomination of James A. Parsons, Hornell, as public service commissioner to succeed Charles G. Blakeslee, Binghamton, whose term of office expired on Feb. 1, 1923. Judge Parsons served for a number of years as a Deputy Attorney-General, was executive counsel during a portion of Governor Smith's first term and occupied that position at the time of his appointment. The appointment was immediately confirmed. It is anticipated Judge Parsons will continue to act as counsel to the Governor until disposition has been made of the thirty-day bills, when he will assume the duties of his new office. The term of office of public service commissioner is ten years.

M. P. Randall is assistant treasurer of the Alabama Power Company, Birmingham, Ala. J. A. Shepherd, auditor, formerly performed the duties for both officerships. F. P. Cummings is now commercial manager instead of F. D. Mahoney.

Charles H. Bigelow, for the last ten years chief mechanical engineer for the Millville Manufacturing Company at Millville, N. J., has resigned to accept the position of plant engineer for the Spicer Manufacturing Corporation, South Plainfield, N. J., makers of universal joints and clutches for automobiles. Mr. Bigelow was formerly connected with the Boston Elevated Railway and was one of the original members of the American Electric Railway Engineering Association, in which he has always held his membership.

Leon C. Bradley of Birmingham has been made director of the Bureau of Public Utility Information of Alabama, according to the announcement of the committee. Mr. Bradley has been connected for a number of years with daily newspapers in Birmingham and Tuscaloosa. He was one of the founders of the Tuscaloosa *News* in 1910 and served as business manager and later as editor of that newspaper. At the time the United States entered the World War he was city editor of the Birmingham *Age-Herald*. For more than a year Mr. Bradley has been connected with the Alabama Polytechnic Institute, serving as publicity director in the Greater Auburn Campaign, and more recently as secretary and treasurer of the Auburn Alumni Association and as a member of the faculty of that institution.

T. J. Hanrahan has succeeded George H. Hunter as master mechanic of the Pacific Coast Railway, San Luis Obispo, Calif.

W. W. Trench, assistant secretary of the General Electric Company, has been appointed secretary of the various committees which will administer the Charles A. Coffin Foundation, a fund of $400,000 which has been created by the board of directors of the General Electric Company, the income from which, approximately $20,000 a year, is to be employed in making awards for meritorious service in the electrical field.

E. A. Bradner Heads New Mexico Association

E. A. Bradner was recently elected president of the New Mexico Public Utilities Association. Mr. Bradner has been identified with public service corporations for more than thirty years. Starting as an arc-light trimmer, he has held all intermediate positions up to that of manager, which office he now occupies with the Las Vegas Light & Power Company and the Las Vegas Transit Company For a number of years Mr. Bradner was chief engineer and superintendent of the Grays Harbor Railway & Light Company, Grays Harbor, Wash, and later became manager of the central station at Hobart, Okla., holding this position until 1919.



E. A. Bradner

E. A. Grove succeeds N. P. Hansen as roadmaster of the Grand River Valley Railway, Grand Junction, Col.

J. E. Hester, master mechanic of the Anderson shops of the Union Traction Company, has resigned to accept a position with the Indiana Public Service Company at Scottsburg, Ind. He will have charge of the shops at that place. Mr. Hester has been connected with the Union Traction Company, Anderson, Ind., in the mechanical department in various capacities since September, 1900. He has held the position as master mechanic for the past five years.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Coal Consumers Should Make Purchases Now

Rate of Reduction of Both Hard and Soft Coal Greater than Last Year, but Stocks on Hand Low

The present situation in regard to the production of anthracite coal may be briefly outlined as follows: The strike in the anthracite field was settled in the middle of September, 1922, and by the end of the month, with all the mines in full operation, maximum production was reached. The average weekly production since the first week in October has been approximately 2,000,000 tons, which is the highest weekly average sustained over the same number of consecutive weeks in any year for which figures are available. The report of the Geological Survey of April 28 shows that the cumulative output during the present calendar year, from Jan. 1 to April 28, is 31,602,000 net tons, an increase of 45 per cent over the production in the corresponding period of 1922.

A somewhat similar situation prevails in regard to soft coal production. During the period of suspension in the unionized bituminous fields (April 1 to Aug. 16, 1922) the non-union mines were producing at the rate of 5,000,000 tons per week. With the resumption of work in the unionized fields, total production increased rapidly, until by the first week in October shipments had reached 10,500,000 tons per week. This weekly average continued until the first of April, 1923. Since that date there has been a slight decline attributable to a change in market conditions in certain sections of the country.

Figures published by the United States Geological Survey show that the cumulative production in the calendar year, from Jan. 1 to April 21, exceeds by 29,000,000 tons the production during the same period in 1922. The average weekly production for April of this year has been about 10,000,000 tons.

As a result of the five months strike anthracite stocks were practically exhausted. Government reports show that on Oct. 1, 1922, a selected list of retail dealers had on hand less than 13 per cent of the supply usually carried on that date. Despite the record production maintained during the winter, conditions on March 1 had but slightly improved. As a matter of fact, supplies on hand on March 1 were about equal to those on hand Oct. 1, 1922, about seven days' margin.

Figures for supplies in the hands of dealers on April 1 are not available nor are there any statistics showing supplies in the hands of the householder. Rationing of domestic anthracite coal was necessary throughout the winter, however, and as there has been little opportunity to accumulate a surplus, it can be confidently stated that the householders' bins are bare.

In anticipation of the strike, stocks of bituminous coal on hand April 1, 1922, were the highest on record, being in excess of 63,000,000 tons. As a result of the strike and with production from the non-union mines insufficient to meet consumption, stocks were so heavily drawn upon during the summer that on Sept. 1 they had been reduced to 22,000,000 tons, the lowest level on record except that of June 1, 1920, when only 20,000,000 tons were on hand. With resumption of mining, the stocks gradually increased and on Feb. 1, 1923, there were on hand 38,000,000 tons. Since that date, however, there has been a decrease. The report of March 1 showed 36,000,000 tons, and it is believed that there has been a further decline since March 1. Stocks are lower today than at the corresponding period in any year of which there is a record.

Policy of Buying

A report on general conditions in the coal trade issued by the Federal Fuel Distributor on April 1 shows that in many producing fields the mines were idle, due to "no markets." This condition, coupled with the fact that users' stocks are being drawn upon, indicates that the consumer is holding back his purchases.

As a matter of insurance, as a help in the transportation difficulty and in order to assist in stabilizing the working time of the miners, the Coal Commission suggests the immediate purchase and storage of coal. Purchases as far as possible should be made through regular channels, in order to avoid duplication of orders and prevent a runaway market.

It should also be borne in mind that the present contract in the anthracite region expires Aug. 31, 1923, and while it may be expected a new agreement will be consummated, there is even then a possibility that production may be curtailed during negotiations which precede the final reaching of a contract. The best insurance against a strike is coal in the bins of the householder.

The great value of storing coal to meet emergencies threatening the usual processes of industry was fully demonstrated in 1922, and this lesson may well be applied in 1923. As an evidence of what can be done in storing bituminous coal, the figures of last year may be reviewed. On April 1, 1922, when the strike began, there was in storage over 63,000,000 tons. On March 1 of this year the Geological Survey reports 36,000,000 tons. This figure should be increased by Sept. 1 to above 65,000,000 or 70,000,000 tons.

Cement Production Increase Shown

At the meeting of the Chamber of Commerce of the United States in New York, May 8, Frederick W. Kelley, president of the Portland Cement Association, outlined the benefits which have resulted from having uniform specifications. The manufacture of Portland cement in this country began about fifty years ago, and has grown by leaps and bounds since that time. In 1892, about twenty years after manufacture began here, the annual production was in the neighborhood of 500,000 bbl. In 1902 it was 17,000,000, and last year about 115,000,000. It is estimated that the maximum production capacity is nearly 150,000,000 bbl.

From 1885 until 1903 the only standards for testing cement were those determined by the American Society of Civil Engineers. However, many engineers felt it incumbent upon themselves to add new details here and there, so that there was really no uniform standard at all. A comparison was made in 1898 of ninety-one different sets of specifications for Portland cement and it was found that no two were alike.

The cement specifications of the American Society for Testing Materials were first adopted in 1902, and progress in that direction continued until in 1921 a single standard had been generally accepted throughout the United States. Membership in the Portland Cement Association now depends on adherence to that standard, and poor quality product has been almost eliminated.

Manufacture is now much more widely distributed than used to be the case, and factories are therefore nearer to their markets. In 1902 Portland cement was made at sixty-five factories in nineteen states, 65 per cent of the production being in the Lehigh Valley of Pennsylvania. In 1922, 118 factories in twenty-seven states were making cement, and only 27 per cent of the product came from the Lehigh Valley.

Metal, Coal and Material Prices

	May 11, 1923
Metals—New York	
Copper, electrolytic, cents per lb	16.06
Copper wire base, cents per lb	19.50
Lead, cents per lb	7.25
Zinc, cents per lb	7.225
Tin, Straits, cents per lb	43.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	6 375
Somerset mine run, Boston, net tons	2.75
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.875
Central, Ill., screenings, Chicago, net tons	1.575
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	7.75
Weatherproof wire base, N. Y., cents per lb.	19.25
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.21
White lead, (100-lb. keg), N.Y., cents per lb.	13.375
Turpentine, (bbl. lots), N.Y., per gal	$1.24

Rolling Stock

Wisconsin Public Service Corporation, Manitowoc, Wis., has received a new city car from the St. Louis Car Company for use on its Manitowoc lines.

Toronto Transportation Committee will purchase cars to the value of $1,660,000 this year. It will also purchase snow-fighting equipment and buses to the value of $90,000, a total for rolling stock of $1,750,000.

Memphis Street Railway, it is reported, will award contracts within the next two months for forty new cars. This is an expenditure provided for as part of the rehabilitation work to be carried out under the improvement program following the discharge of the receivers.

Manitowoc & Northern Railway, Manitowoc, Wis., has added to its equipment two new one-man interurban cars built by the St. Louis Car Company. The cars weigh 15 tons each. They will replace in service older cars which have been sold to the Evanston Street Railway, Evanston, Ill.

Niagara Junction Railroad, Niagara Falls, has purchased two electric locomotives from the Westinghouse Electric & Manufacturing Company, increasing the total number now in service to five. Each of the new locomotives will weigh 43 tons, and will be equipped with four Westinghouse type 552-FA-17 motors rated at 65 hp., and having HLF control. The railroad originally intended to purchase one locomotive weighing approximately 81 tons, but later decided that with two locomotives a more flexible service could be rendered. This railroad operates on 600 volts direct current, drawing its power from an overhead trolley wire by a wheel and pole or pantograph.

Track and Roadway

Milwaukee Electric Railway & Light Company will install about 5,000 thermit joints this year. This is the approximate number installed during 1922.

Jacksonville, Fla.—The City Commission, although refusing to approve or disapprove the plan, has by a vote of three to two adopted a revised draft of Commissioner St. Elmo W. Acosta's resolution seeking a popular vote on the question of whether the city of Jacksonville shall build and operate an electric railway to Pablo Beach, either by bond issue or from the earnings of the electric plant.

Indiana Service Corporation, Fort Wayne, Ind., has started the work of double tracking its line south on Calhoun Street from Pontiac Street. The double-tracking has been made necessary by the great growth in the southern part of the city, and by the erection of the $1,000,000 south side high school on Calhoun Street about eight blocks south of Pontiac Street. The board of public works granted permission for the work as soon as the traction company broached the project.

Pittsburgh Railways in a petition filed in the Federal court has asked for permission to spend $189,510 to rehabilitate double tracks in Brownsville Road through the Boroughs of Mount Oliver, Knoxville, Carrick and Brentwood. Another petition asked for permission to purchase an automobile truck tower for the repair of trolley wires in the East End district at a cost of $4,500.

Detroit United Railway is expecting to build about 1¼ miles of track this year in Flint, Mich., to reach the Durant automobile plant. It is also expecting to build 1.05 miles of second track near Flint, with the addition of an interlocker where the tracks cross the Père Marquette Railway lines. The track on Packard Street, Ann Arbor, is also to be reconstructed for about a half mile. Seventy-pound A.S.C.E. rail will be used on cedar ties on a gravel foundation, with cement from the bottom of the tie to the top of the rail, and the joints will be welded. Recent construction by the company has included a change of track over the Rouge River bridge in Wayne County, near Detroit, and on the West Jefferson Street bridge in Detroit. The cost of these two pieces of construction was about $60,000 total.

Shops and Buildings

Eastern Wisconsin Electric Company, Sheboygan, Wis., has purchased ground for an addition to its steam generating plant at Sheboygan, upon which it is proposed to expend $180,000.

San Diego (Calif.) Electric Railway has made application to the City Council for permission to extend its Woolman Avenue line to Imperial Avenue at Thirty-ninth Street from its present terminus at Woolman and Thirtieth Street. It is understood the company desires the franchise so that it can abandon the Imperial Avenue line beyond Thirty-second Street. At present both the Imperial Avenue and Woolman Avenue routes are operated over the same line as far as Twenty-fifth and Imperial.

New Incorporations

San Antonio & Rio Grande Valley Traction Company, Falfurrias, Tex., has been organized by V. P. Williams of Dallas and associates for the purpose of building and operating an electric railway between Falfurrias to a point on the St. Louis, Brownsville & Mexican Railroad near McAllen, about 60 miles. It is planned ultimately to extend the line to Point Isabel, on the Gulf Coast, and to San Antonio. According to Mr. Williams financial arrangements for building the first section of the road have been made.

Trade Notes

E. W. Rockafellow, for a number of years general supply sales manager of the Western Electric Company, has become a vice-president of the National Pole Company, Escanaba, Mich., and will represent that company at 220 Broadway, New York.

S. P. Wright & Company, district representatives of the Conveyors Corporation of America, 326 West Madison Street, Chicago, have moved their offices from 109 East Broadway, Butte, to 812 East Iron Street, Butte. The Wright organization handles the sales of American Steam Jet Ash Conveyors in the State of Montana.

Johns-Pratt Company, Hartford, Conn., manufacturer of Noark fuses, meter service and protective devices, cutout bases, fuse accessories, vulcabeston packing and insulating parts, and Johns-Pratt molded insulation, has established an export division with office at 30 Church Street, New York City. E. Wilhelm Droosten and W. L. Urquhart, who have had extensive experience in handling export business of electrical manufacturers, will be in charge of this division.

Ross F. Hayes has resigned as general sales manager of the Curtain Supply Company to engage in the railway supply business, with office at 2 Rector Street, New York City. He is now Eastern representative of the Henry Giessel Company, Chicago, manufacturers of water coolers for service on railway passenger cars and locomotives; the Protecto Manufacturing Company, Chicago, manufacturers of metal-bound weather stripping; the Anti-Freezer Company, Chicago, manufacturers of "The Anti-Freezer" for prevention of freeze-ups in air-brake systems, and other manufacturers engaged in building car fittings and other devices for use in the electric railway field.

New Advertising Literature

Golden Anderson Valve Specialty Company, Pittsburgh, Pa., has issued an illustrated booklet describing its patent cushion valves of various types, such as triple-acting non-return valves, plain non-return valve, quick-closing emergency-trip valves, combined throttle and automatic engine-stop valves, steam pressure reducing valves, etc.

Crouse-Hinds Company, Syracuse, N. Y., has issued catalog No. 2,000, on condulets. This is a new publication which supersedes all previous catalogs and bulletins. Its more than 700 pages are replete with information on fittings for every conceivable situation, including many for use on railway cars. The book is fully indexed in terms of catalog numbers and names of articles, and there is also a picture index. It is flexibly bound and is furnished with a thumb index.





— *always associated!*

Peacock Staffless Brakes

with the standard safety car

Because it has achieved such a recognized superiority in lightness, space-saving features, power, capacity and reliability, in short, because it has fulfilled the purpose where others have failed, the Peacock Staffless Brake is being more and more generally specified for new Safety cars. This is especially true when expert engineering talent has had a hand in the specifications—witness the Detroit and San Francisco Municipals, Washington Railway and Electric, the Hydro-Electric Power Commission of Ontario and numerous others.

The Peacock Staffless Brake is designed to stop and hold the car, on the worst grades, with the highest live load ratio, even up to one hundred per cent on these extraordinarily light-weight cars. Consider it!

Let us send you some information concerning companies which have tried other brakes and have finally come to standardize on Peacock Staffless Brakes for Standard Safety Cars.

NATIONAL BRAKE COMPANY, INC.

890 ELLICOTT SQUARE, BUFFALO, NEW YORK

Canadian Representative: Lyman Tube & Supply Co., Montreal, Can.

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

JOHN A. BEELER
OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT
52 VANDERBILT AVE., NEW YORK

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
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CHICAGO

J. ROWLAND BIBBINS
Engineer—921 Fifteenth St., WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
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REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

JOE R. ONG
Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
PIQUA, OHIO

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
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EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND 1570 Hanna Bldg. NEW YORK 84 Pine St.

HEMPHILL & WELLS
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APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

WALTER JACKSON
Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

REDUCE ASSEMBLY AND PRODUCTION COSTS *with* IRV-O-SLOT INSULATION

Irv-O-Slot Insulation is Varnished Cambric duplexed with any standard thickness of Fibrous Insulation. The materials are cemented with a flexible binder that permits shaping without separation of the layers.

Supplied in sheets or strips or cut to slot sizes.



Reduces Cutting Operations

Speeds Assembly

Mitchell-Rand Mfg. Co., New York
Clapp & LaMoree, Los Ang. & San Francisco, Cal.

Sales Representatives
Consumers Rubber Co. Cleveland, O.
E. M. Wolcott Rochester, N. Y.

L. L. Fleig & Co. Chicago, Ill.
F. C. Scofield Toronto, Ont., Canada
T. C. White Electric Supply Co. St. Louis, Mo.

Manufacturer

Irvington Varnish & Insulator Co., Irvington, N. J.

ESTABLISHED 1905

AMERICAN ELECTRICAL WORKS — AMELECTRIC — Wires and Cables — PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNETIC WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way

STEVENS & WOOD, INC.
ENGINEERS

Design and Construction of Steam and Hydro-Electric Power Stations, Transmission Lines: Railroad Electrification and Industrial Plants.

Reports and Valuations

Management and Financing of Public Utility and Industrial Corporations.

Mahoning Bank Bldg. Youngstown, Ohio
120 Broadway New York

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK
Street Railway Inspection DETECTIVES
131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

A Really Useful Wiring Handbook

This book will enable the inexperienced as well as experienced wiremen to meet the requirements of the National Electrical Code.



Croft's Wiring for Light and Power

426 pages, flexible, pocket size, $3.00 net, postpaid

A Wiring Handbook
That fits the requirements of the National Code.

That conforms to the best American practice.

That is indexed so that you can find instantly the facts you need.

That is a common sense, practical commentary on the National Electrical Code.

That tells how to install wiring and apparatus for practically all services, under practically all conditions.

That tells how to install these so as to be electrically safe and mechanically correct.

That explains why installations should be made in a given way.

Examine it for 10 days FREE

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York, N. Y.

You may send me on 10 days' approval, Croft's Wiring for Light and Power, $3.00. I agree to remit for the book or return it postpaid within 10 days of receipt.

Member of A. I. E. E.?.....
Subscriber to Electric Railway Journal?..
Signed.....
Address .....Official Position.....
Name of Company..... F.E

Laying Resilient ties in con *traffic* and without temporary crossovers



DAYTON

crete *without interruption to*

hink of having a permanent, easy-riding track n a permanent concrete foundation without nterrupting service during construction and ithout the expense of temporary crossovers.

)n the page opposite are shown city and inter-rban cars operating on a five- and thirty-minute eadway, respectively, while dry concrete is eing tamped under the ties.

he setting of unseasoned concrete is not, in ny way, disturbed by the operation of the cars ver it.

he asphalt cushion in the *resilient* tie absorbs ne shocks so effectively that they do not reach ne green concrete.

ests have proved this construction sound. On ther properties where this method was em-loyed the concrete was found to be in perfectly ood condition after 3 years of service.

esilient ties are fundamentally and practically ght, moreover, they permit of a saving of $6000 a ile over wood ties laid in concrete. ***Ask for de-riptive literature.***

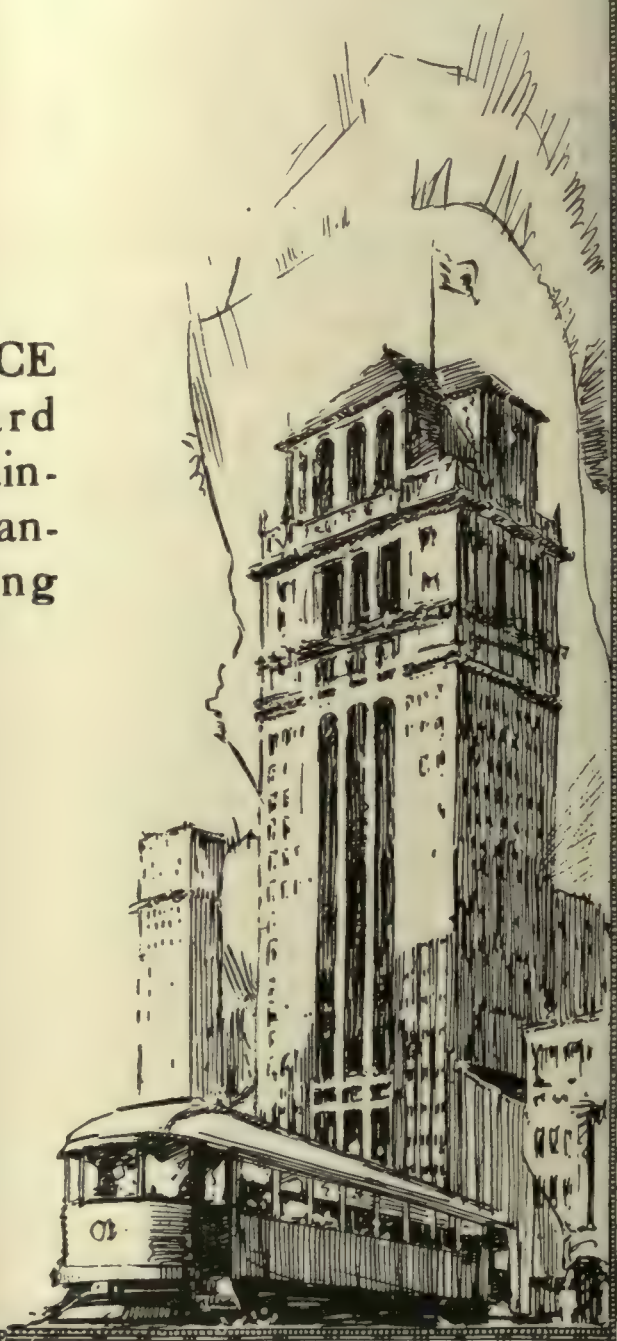
The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



Resilient TIE

cushion the shock on the rolling stock

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier INCORPORATED

CANDLER BLDG NEW YORK



Great Northern depot at Minneapolis.



Two 307 H. P. Edge Moor Boilers in this station supply power for the Minneapolis depot.

GREAT NORTHERN RAILWAY

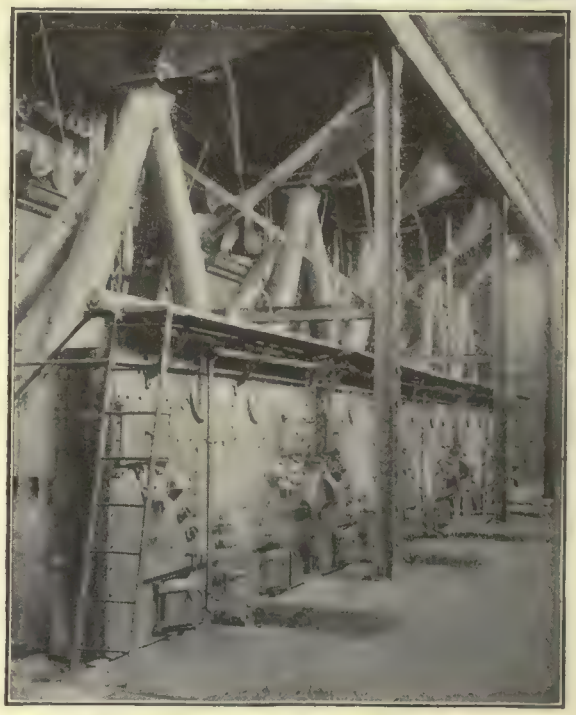
THE Great Northern installed its first Edge Moor Boilers in the shop at Allouez, Wis., in 1902. Now the Great Northern has fourteen Edge Moors, representing seven separate orders, in its depots and shops at Minneapolis, St. Paul, West Superior and Allouez.

The Pennsylvania, the Reading, the New York Central, and the Soo Line are among the other railroads that have equipped shops or terminals with Edge Moor Boilers.

Construction details and performance records, together with much valuable data for the plant operator, are contained in the Edge Moor catalogue. Tell us where to send your copy.

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE

New York Chicago St. Paul Boston Pittsburgh Charlotte



Six 260 H. P. Edge Moor Boilers in the Dale Street Shops of the Great Northern at St. Paul.

EDGE MOOR Water Tube BOILERS

EDGE MOOR BOILERS — EDGE MOOR, DEL. U.S.A.

FOR INCREASED FUEL ECONOMY

A Working Principle—Not an Embalmed Ideal

ABP STANDARD No. 2

"To subscribe to and work for TRUTH and honesty in ALL departments."

FEW there are who do not know of the great TRUTH and BETTER BUSINESS movement, which was inaugurated by the Associated Advertising Clubs of the World about ten years ago.

It was the fused and awakened sentiment of the publishing and advertising interests, that to them belonged the responsibility for purifying the stream of publicity and keeping it clean.

Since then these men have procured the adoption of clean advertising laws in nearly every state with Vigilance Committees to enforce them. The crooks and swindlers have been driven from the pages of reputable publications, and the power and virility of straight truth-telling has been brought home to all advertisers.

As the Business Press Department of the National Advertising Commission of the A. A. C. of W., The Associated Business Papers, Inc., is proud and glad to be a part of this work. We have incorporated the TRUTH motive into our own standards and our practices.

Note well the word "ALL" in Standard No. 2. It applies with equal force to *all* departments of our papers —editorial as well as advertising.

As a logical sequence of Standard No. 2, we adopted Standard No. 5

A B P STANDARD No. 5

"To decline any advertisement which has a tendency to mislead, or which does not conform to business integrity."

THIS imposes a definite obligation upon A B P papers which cannot be misunderstood. In this Standard, our publishers plainly acknowledge their responsibility to their subscribers, and pledge themslves to keep the trusteeship inviolate.

Do you not begin to see why business papers aspire to A B P membership; why membership carries the prestige that it does; and why A B P papers are getting preferred consideration from those who believe in high standards especially when coupled with practical achievement?

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSIE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY



CARNEGIE
WROUGHT STEEL
WHEELS

give you what you want—

Longer Service
at Lower Cost

Carnegie Steel Company
GENERAL OFFICES; CARNEGIE BUILDING, PITTSBURGH, PA.

1618



Bates Engineers will gladly co-operate with you in your planning.

Bates Steel Pole Strength

The stability of installations built with Bates Poles as the ***backbone*** of the construction reflects the progressive trend of the organization using them.

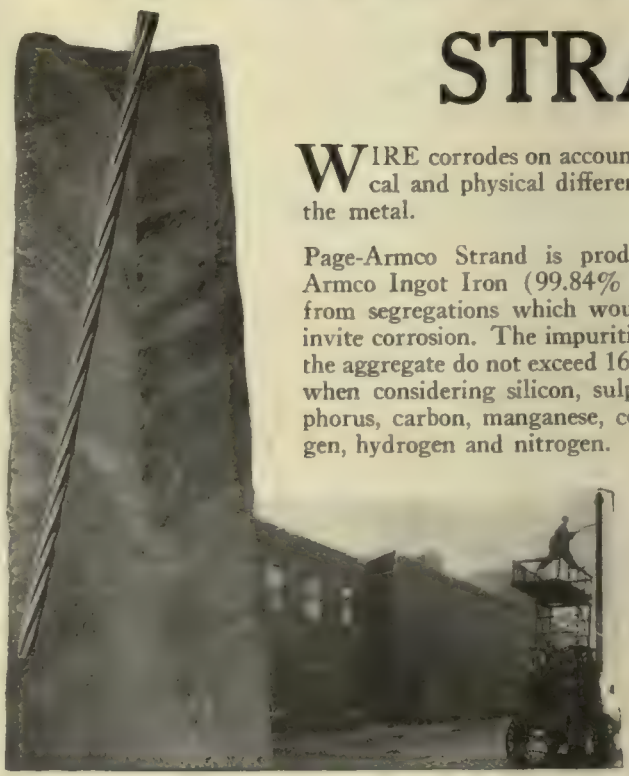
Use Bates Poles—Poles of a character consistent with the high standards you demand and specify for the rest of your equipment. Bear in mind Bates prices compare favorably with the cheapest substitutes.

Bates Expanded Steel Truss Co.

Illinois Merchants Bank Bldg.,
CHICAGO, ILLINOIS, U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

PAGE-ARMCO STRAND WIRE



WIRE corrodes on account of chemical and physical differences within the metal.

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion. The impurities taken in the aggregate do not exceed 16/100 of 1% when considering silicon, sulphur, phosphorus, carbon, manganese, copper, oxygen, hydrogen and nitrogen.

The extra galvanized coating on Page-Armco Strand combined with the purity of the wire insures maximum service.

Page-Armco Iron Strand is used as messenger strand, guy wire or strand, telephone wire or strand, trolley span wire, ground wire or strand, telegraph wire, and as power transmission conductors.

PAGE STEEL AND WIRE COMPANY
Bridgeport, Conn.

DISTRICT SALES OFFICES:
Chicago New York Pittsburgh San Francisco

MANUFACTURERS OF:

Rods—Armco Ingot Iron and Special Analysis Steels.
Wire—Plain and Galvanized—Spring, Rope, Telephone, Telegraph, Bond, Strand, Oxy-Acetylene and Electric Welding Wire.
Fence—Woven Wire for Farm and Railway Right of Way. Wire Link Protection for Industrial Plants, Lawns, Schools and Estates, and Factory Partitions.

STEEL AND WIRE PAGE QUALITY PRODUCTS

ARMCO INGOT IRON

The Great and Particular Value of

CYPRESS

"THE WOOD ETERNAL"

is its **high resistance to decay.** (Specify "All-heart **Tidewater** Cypress"—every piece identified by the above trade-mark.)

The Railway Signal Association has always placed all-heart Cypress among the first choices in the list of suitable woods for

Trunking and Capping

The Railway Signal Association makes its recommendations as a result of definite **knowledge,** and its membership includes many able men who are Cypress enthusiasts. We gladly refer any doubter as to Cypress superiority to any well posted engineer who has had experience with "The Wood Eternal."

The same service conditions which make Cypress superior for "Trunking and Capping" are present in many other railway lumber requirements, such as

Fencing

and similar purposes where the material is exposed constantly to the weather and **high resistance to decay is essential.**

If railway men in general will study the question of wood durability for other uses as carefully as Railway Signal men have studied it there will be a lot more all-heart Cypress used in railway service — **to the very great economy of the companies using it.**

Our data is at your service

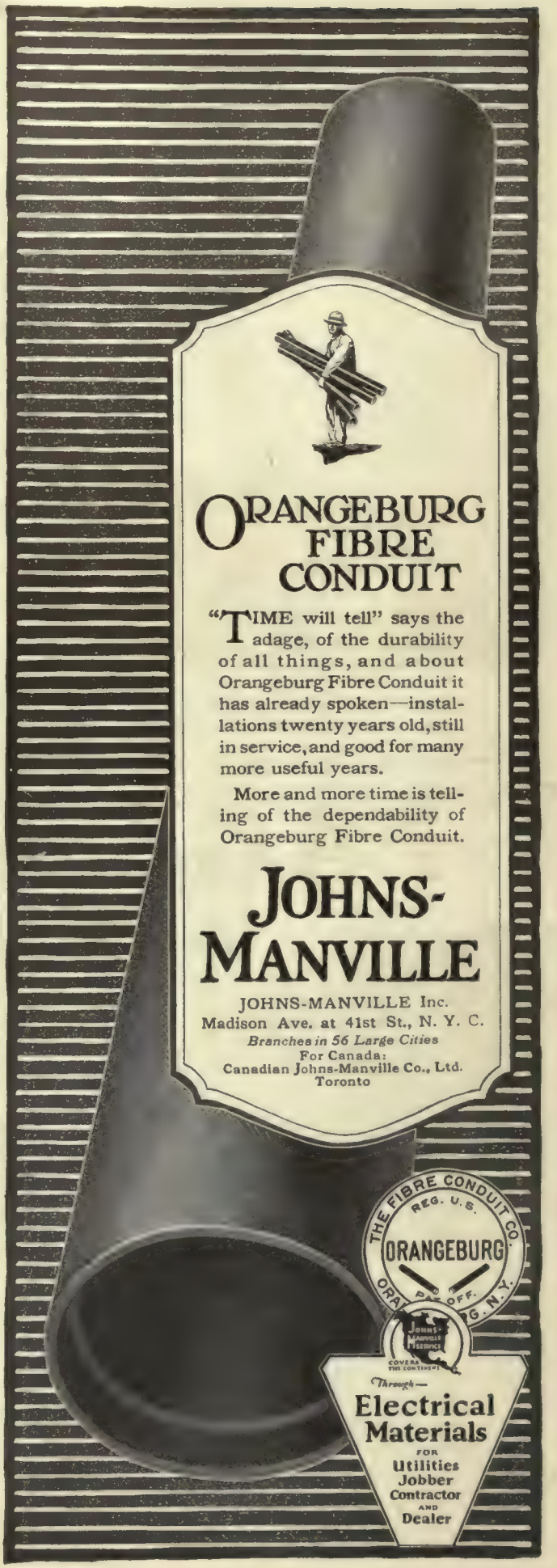
Will you write us? We will reply frankly.

Southern Cypress Mfrs.' Assn.

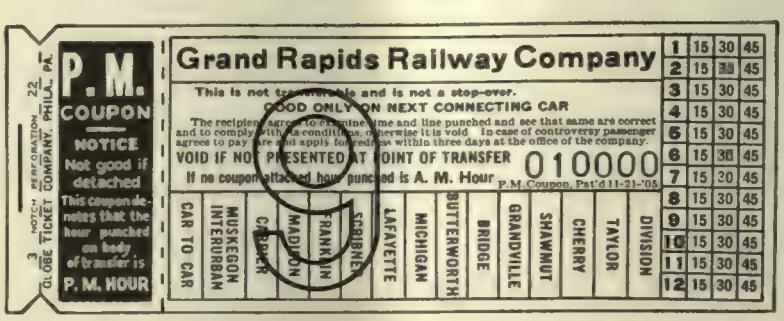
1265 Poydras Building
New Orleans, La.

or

1265 Graham Building
Jacksonville, Fla.



Globe Transfers Will Help



P. M. Coupon Transfers are a material help to Railway Operators.

Transfers obtained in the morning cannot be used for the return trip in the evening. Conductors can tell at a glance whether the ticket is right or wrong.

This, and the saving of time in punching, helps you to give better service, and so build up Good Will.

Globe Ticket Company, 116 N. 12th Street, Philadelphia, Pa.

Los Angeles New York San Francisco

Your Passengers Will Enjoy Their Ride On

Hale & Kilburn Seats

Especially Designed for
One Man Safety Cars



Lightest Weight Stationary Steel Seat

Lightest
Strongest
Simplest
Neatest



Lightest Weight Walkover Steel Seat

No higher in price than others
Write for particulars

Hale & Kilburn Corporation
American Motor Body Company, *Successors*
PHILADELPHIA

New York 30 Church St. | Chicago McCormick Bldg. | Richmond Mutual Bldg. | Atlanta Candler Bldg. | San Francisco 71 First St. | Los Angeles 447 E. 3rd St.



PRACTICALLY all gears make a good showing in their advertising but the real story of comparative quality is found in their service records. Nuttall BP gears have made many, many records which have never been equalled.

Ask the man who uses them.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1923

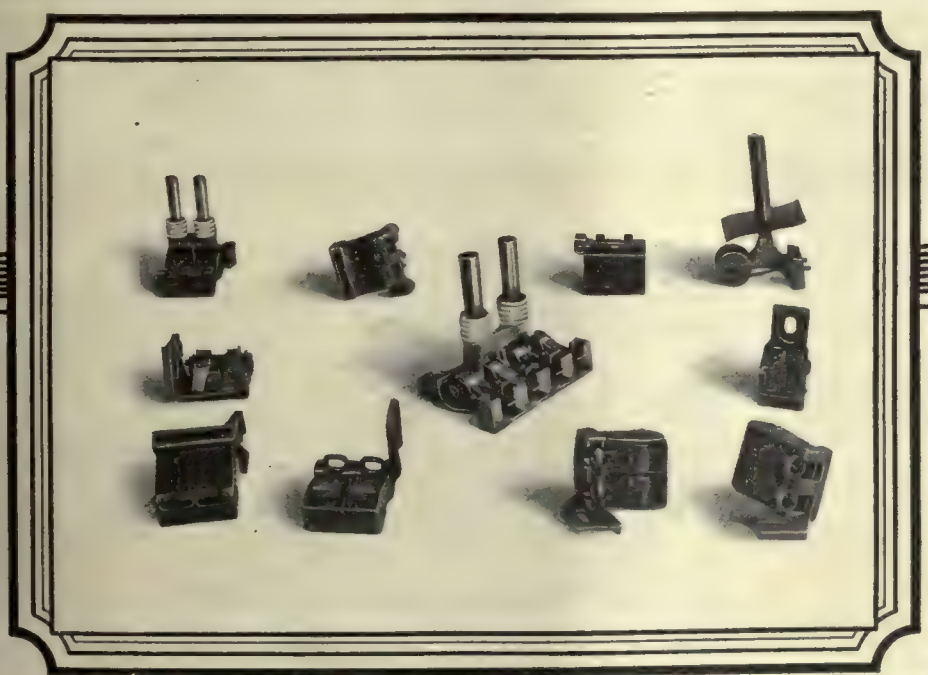
R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

EVERY GEAR REGISTERED

Nuttall



The COLUMBIA Brush Holders

—are built to withstand long and hard service.

COLUMBIA 18 92 MACHINE WORKS

3313 Atlantic Ave., Brooklyn, N. Y.

NOTE — Our Telephone Number has been changed to Applegate 3200-1-2

This is Station C-A-R

THE BIRTHPLACE OF THE SAFETY CAR



Building Quality Cars—Broadcasting Economical Operation and Durability—Tune In!

Use Quality Cars Built By

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

Tokio Municipal Electric Railway Cars Equipped With Baldwin Motor Trucks

FOR city service, the Baldwin Class "L" is the most satisfactory two-motor equipment. The motors are outside hung, thus permitting of a short wheel base. The brakes are inside hung.

A distinct feature of this truck is that the railway company can make repairs in its own shop, without keeping the car out of service any length of time.

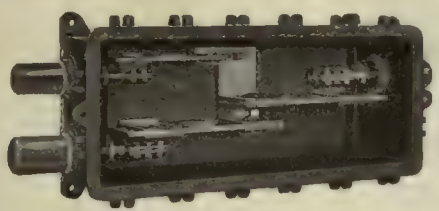


Baldwin Motor Truck, Class 58-18-"L" in service. Gauge, 4 ft. 8½ in. Center pin load, 18,000 pounds

Simplicity, economy and low cost of maintenance characterize the Baldwin Class "L" Truck. Full information upon request.

THE BALDWIN LOCOMOTIVE WORKS

1033 PHILADELPHIA, U. S. A. Cable Address: "Baldwin, Philadelphia"



Manhole Junction Box for Underground Feeder Circuit

THE installation, operation and maintenance of underground cable systems are greatly simplified by the use of STANDARD junction boxes. The illustration shows a specially designed box for trolley feeder service which makes possible the disconnecting and sectionalizing of the different parts of the circuit while alive by simply opening one or more quick-break knife switches. This box is easily and quickly connected with the cable by wiped joints. It is perfectly waterproof when installed.

STANDARD Underground Cable Co.

Boston, New York, Philadelphia, Pittsburgh, Washington, Atlanta, Detroit, Kansas City, Chicago, Salt Lake City, Minneapolis, St. Louis, San Francisco, Seattle, Los Angeles

For Canada: Standard Underground Cable Co. of Canada, Limited, Hamilton, Ont.

The Baker
Wood Preserving Company
CREOSOTERS

Washington Court House, Ohio

Cross Ties — Bridge Timbers
Lumber — Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

ROME WIRE

BARE AND INSULATED

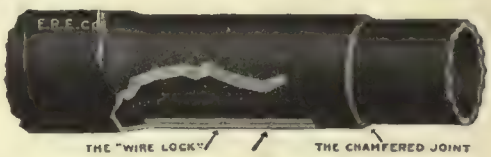
Rome Merit Wins Customers
Rome Service Holds Them

ROME WIRE COMPANY

Main Plant and Executive Offices: Rome, N. Y.
"Diamond" Branch: Buffalo, N. Y.

DISTRICT SALES OFFICES:
New York, 50 Church St. — Chicago, Ill., 14 E. Jackson Blvd.
Boston, Mass., Little Bldg. — Detroit, Mich., 25 Parsons St.
Los Angeles, Cal., J. G. Pomeroy, 336 Azusa St. 2113-L

ELRECO TUBULAR POLES



COMBINE

Lowest Cost — **Lightest Weight**
Least Maintenance — **Greatest Adaptability**

Catalog complete with engineering data sent on request

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.
Engineers and Contractors — SYRACUSE, N. Y.

Lapp Insulators
Lapp Insulator Co. Inc. LeRoy, N.Y.
Trade Mark

OKONITE
TRADE MARK

Varnished Cambric Wires and Cables

are built to meet the most exacting requirements.

When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes

THE OKONITE CO., Passaic, N. J.
Incorporated 1884

Sales Offices:
New York—Atlanta—San Francisco

Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new Rail Bond Book

American Steel & Wire Company
CHICAGO
NEW YORK



When you want to anchor one cable and take a branch wire off the anchored cable

DOSSERT CABLE ANCHOR

Consists of an elbow and clevis for the strain insulator—so arranged that pull is exerted on one cable only.

There are several types of Dossert Cable Anchors shown in the 15th Year Book, which catalogs the whole line.

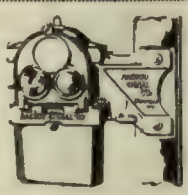
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FREE

Dossert & Co.
242 West 41st Street
New York, N. Y.

AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders



NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KY.

ANACONDA TROLLEY WIRE



ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

Peirce Forged Steel Pins with Drawn Separable Thimbles
Your best insurance against insulator breakage
Hubbard & Company
PITTSBURGH, PA.



INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY



U. S. ELECTRIC AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
West Newton, Mass.

Chapman Automatic Signals
Charles N. Wood Co., Boston



Shaw Lightning Arresters
Standard in the Electric Industries for 35 years
Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 38-39 Upper Thames St.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

Series Type

Arc Welding and Bonding Outfit

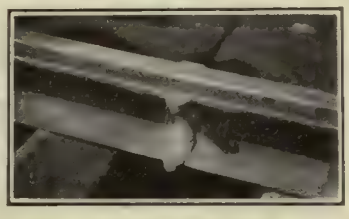
Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

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An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.



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Special advantages — (1) Rail ends are butted together and easily aligned, no inserts needed to fill in or adjust. (2) Smaller portions of material used. (3) Grinding reduced to the minimum, only a slight touching up is needed.

The Feralite Rail Welding Process eliminates rail joints at a lower cost than any other process. Write for full details.

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For Street and Steam Railways

Steel Castings **Gas Cylinders**

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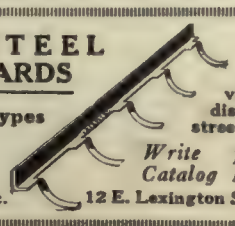
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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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GODWIN STEEL PAVING GUARDS

Adapted to all types of rails and paving.



Proven by service to economically prevent seepage and disintegration of street railway paving.

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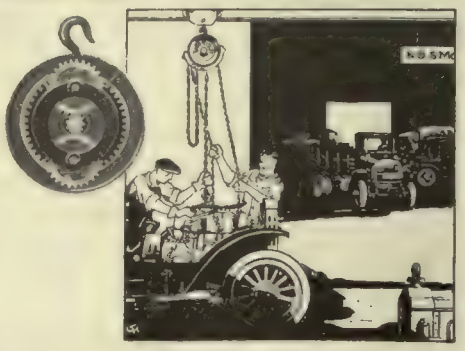
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Successor

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Automatic Return Switch Stands for Passing Sidings
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Manganese Construction—Tee Rail Special Work

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For Accurate Placing

THE Tribloc lowers its load gently and accurately into place. To understand why, one has only to examine the planetary gear system. Such a well balanced drive insures absolute smoothness of operation. A Tribloc will never jump, jam, or jerk under its proper load.

Write for information on any type or capacity to 40 *tons.* 2217-D

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Established 1858

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Frogs, Crossings, Switches and Mates
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

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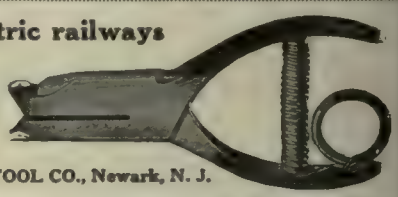
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"Make it of Vul-Cot Fibre"
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75% of the electric railways use
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Send for Catalog
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Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

A Single Segment or a Complete Commutator
is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.
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Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Far East. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

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High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

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Heywood-Wakefield Co. 516 West 34th St., New York
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The indication and registration of the amount paid are features inseparable from successful retail merchandising.

Ohmer Fare Registers apply these essential features to the sale of electric railway transportation.

Ohmer Fare Register Company
Dayton, Ohio

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ELECTRIC HEATER EQUIPMENTS



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Address All Communications to
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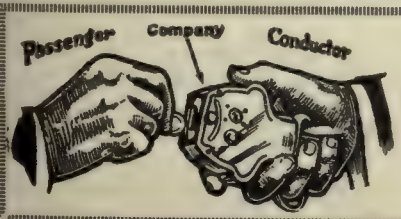
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Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

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Direct Automatic Registration By the Passengers

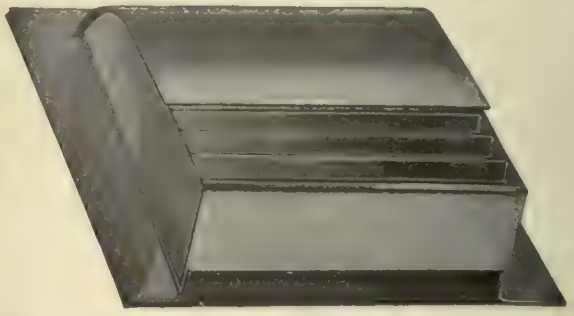
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COIN
COUNTERS SORTERS WRAPPERS

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THE N-L New Style Type C Ventilator is absolutely weatherproof, lays low on roof, looks well and meets every requirement of ventilation.

More than seven thousand N-L Ventilators sold during 1922.

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N-L Products manufactured and sold in Canada by
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- National Hand Holds
- Pittsburgh Forge & Iron Co.'s Products
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- C-H Electric Heaters
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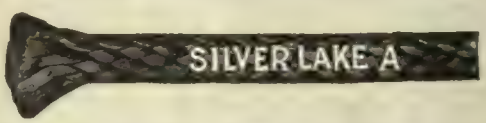
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There are many cars *not* equipped with

AJAX CAR BRASSES

The cars that *are* equipped with Ajax Brasses keep on the road, day after day

The Ajax Metal Company
Established 1880
Philadelphia, Pa.
NEW YORK CHICAGO BOSTON CLEVELAND

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY.**

Sold by Net Weights and Full Lengths

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Manufacturers of bell, signal and other cords.
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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. **Write for details.**

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RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also **ELECTRIC THERMOMETER CONTROL**
of Car Temperatures.

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Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

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AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION



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Sells Transportation

Let our experts on railway car finishing demonstrate Beckwith-Chandler paints and varnishes. Write for details.

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Gets Every Fare
PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

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100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
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in weight, initial and upkeep costs
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E. R. J.

POSITIONS VACANT

DRAFTSMEN, experienced steam and street railway, special track work draftsmen and calculators; advise experience and salary in first letter. P-546, Elec. Railway Journal, Old Colony Bldg., Chicago, Ill.

FIRST-CLASS draftsman wanted for street railway master mechanic's office. Must be competent in car design and should have some mechanical and electrical engineering ability. P-542, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

MASTER mechanic wanted by Interurban Railway Company located in the northwest; must be thoroughly competent, able to take charge of shop, and equipment consisting of 15 interurban motor cars and other trailer equipment; state when available and give full references in first reply. P-547, Elec. Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT wanted for small city and suburban line, Eastern territory. State experience and salary expected. P-550, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

ACCOUNTING executive, thoroughly experienced in all branches of large properties: street railway, light, power and gas utility, open for engagement. Capable of assuming full control of all accounting work. PW-543, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation. Twenty years' experience in electrical line, operating city, interurban and suburban property. Good record based on long experience with large property. Present relations are pleasant, personal reasons for desiring a change. PW-533, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation with a proven successful record of 18 years on large city, suburban and interurban properties, at present employed, desires a change and will consider any property that needs a practical, progressive, efficient transportation man who is capable of taking over all details of transportation and handling same in a manner that will get results and be a credit to any property. Present relations are pleasant. Personal reasons for desiring a change. High grade references as to character and ability. Would prefer city and suburban property. Address with details PW-544, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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G. E. CO. ROTARY CONVERTER

60 cy., 13,200 or 6600 v. A.C. to 590 v. D.C., 2200 kw.

Includes the following:

Item 1—Type HCC, 16 pole, 2200 kw., 450 r.p.m., 590 v. Synchronous Converter with booster and instruments.

Item 2—3 type WC, 60 cy., 900 kva., 13,200-6600 v. primary, 368 v. secondary, water-cooled Transformers with 10% taps above and below normal and 50% starting tap.

Item 3—Complete 3 panel switchboard for the above. Built 1917

Has been run only for test—prompt shipment—attractive price

Picture of Converter appeared in March 17th issue.

Apply General Chemical Company
40 Rector St., New York, N. Y.

Interurban Car Bargains

4—Cars, excellent condition, weighing 25 to 28 tons each; seating 54; complete equipment; 4 Wh. 306 motors for 600 v. D.C. operation.

Will furnish photographs and full specifications upon application.

Warren & Jamestown Street Railway Co.
Warren, Pa.

FOR SALE

Porcelain Insulators

2,000 22,000-v., 1-in. pin hole

The Northwestern Ohio Ry. & Pr. Co.
Oak Harbor, Ohio.

TO HELP YOU

SELL USED EQUIPMENT

"Searchlight" Advertising

G-2

Notice to Manufacturers of and Dealers in Radio Receiving Apparatus, Electrical Marine Equipment, Electrical Railway Equipment, and Other Electrical and Steam Machinery

TAKE NOTICE that on Thursday, the 24th day of May, 1923, at 2 o'clock in the afternoon, at the plant of the Horne Manufacturing Company, 243 Mercer Street, Jersey City, New Jersey, the undersigned, receiver of said Company, will offer for sale all of the assets of the said Company under order of the United States District Court for the District of New Jersey.

The entire assets of the corporation will first be offered in one lot, in bulk. Thereafter, said assets will be offered in lots as follows:

(1) Radio apparatus, consisting of receiving sets, finished and partly finished, and unassembled parts, finished and partly finished, tubing, aluminum and brass pieces.

(2) Electrical marine interior equipment for ships, consisting of watertight electrical fixtures, mechanical telegraph fittings and voice tube fittings, finished and partly finished.

(3) Electrical railway fittings, consisting of handbrakes, partly finished, and trolley bases, partly finished.

(4) Machinery, motors and necessary shafting, belting and other power transmission appliances.

(5) Fixtures and raw material not apportioned, consisting of brass rod, steel rod, tubing, boards, work-benches, small tools, bins, and office fixtures.

(6) Accounts receivable, together with good will, trade marks, patents and patent rights, electrotypes and catalogues.

Bidders will be required to deposit with the receiver at the time of bid, ten per cent in cash or certified check. The balance is to be paid within five days after confirmation of the sale by the United States District Court.

Purchasers will be required to remove articles purchased before June 5, 1923.

All bids and offers are subject to confirmation by the Court, to which such bids will be submitted for approval on May 28, 1923, at 10:30 A. M., Post Office Building, Trenton, New Jersey.

Dated May 7th, 1923.

JAMES A. HAMILL,
Receiver of Horne Manufacturing Company.

ROTARY CONVERTER

1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

"SEARCHLIGHT"

Opportunity Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take advantage of it — For Every Business Want

"Think SEARCHLIGHT First"

9165

FOR SALE

SAFETY CARS

16 Standard Birney. Practically New.

TRANSIT EQUIPMENT COMPANY
Cars—Motors
501 Fifth Avenue, New York

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control. West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Electric Service Sup. Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones Br. & Metal Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
Bearings an Bearing Metals
Ajax Metal Co.
Baldwin Locomotive Works
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Le Grand, Inc., Nic
Westinghouse E. & M. Co.
Bearings Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Western Electric Co.
Boilers
Babcock & Wilcox Co.
Edge Moor Iron Co.
Boiler Tubes
Edge Moor Iron Co.
Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.
Western Electric Co.
Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Western Elect. Co.
Westinghouse E. & M. Co
Brackets and Cross Arms (See also Poles, Ties Posts, etc.)
Bates Exp. Steel & Tr Co.
Electric Ry. Equip. Co
Electric Service Sup Co
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
National Ry. Appliance Co
Westinghouse Tr. Br. Co
Brake Shoes
Amer. Br. Shoe & Fdry Co
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G
Columbia M. W. & M I Co
Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I Co
General Electric Co
Johns-Manville Inc
National Brake Co.
Safety Car Devices Co
Westinghouse Tr. Br. Co.
Brooms, Track, Steel or Rattan
Amer. Rattan & Reed Mfg. Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.
Brushes, Graphite
U. S. Graphite Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Bus Seats
Hale & Kilburn
Heywood-Wakefield Co.
Cables (See Wires and Cables)
Cambric, Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.
Carbon Brushes (See Brushes Carbon)
Car Lighting Fixtures
Electric Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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Catchers and Retrievers, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
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Archbold-Brady Co.
Western Electric Co.
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Cleveland Fare Box Co.
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Dossert & Co.
Electric Ry. Equip. Co.
Electric Service Sup Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M Co
Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
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Coils, Choke and Kicking
General Electric Co.
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Coin-Counting Machines
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Internat'l Register Co., The
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrapping Machines
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Commutator Truing Devices
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Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
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Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Western Electric Co.
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Samson Cordage Works
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Brill Co., The J. G.
Ohio Brass Co.
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Crossing Foundations
International Steel Tie Co.
Crossing Frog and Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing, Manganese
Ramapo Ajax Corp.
Crossings Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
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Allis-Chalmers Mfg. Co.
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Electric Service Sup. Co.
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Derailing Switches
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Wish Service, P. Edward
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Hale & Kilburn
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Nat'l Pneumatic Co., Inc.
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Drills, Track
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Railway Track-Work Co.
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Frogs, Track
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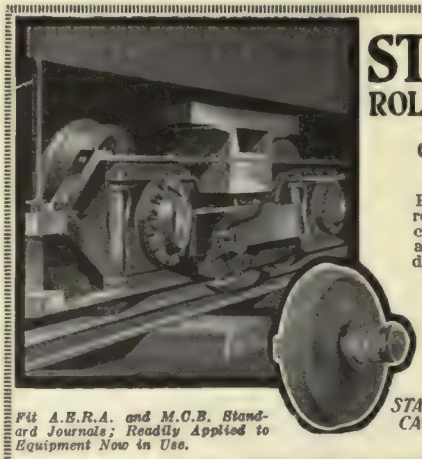
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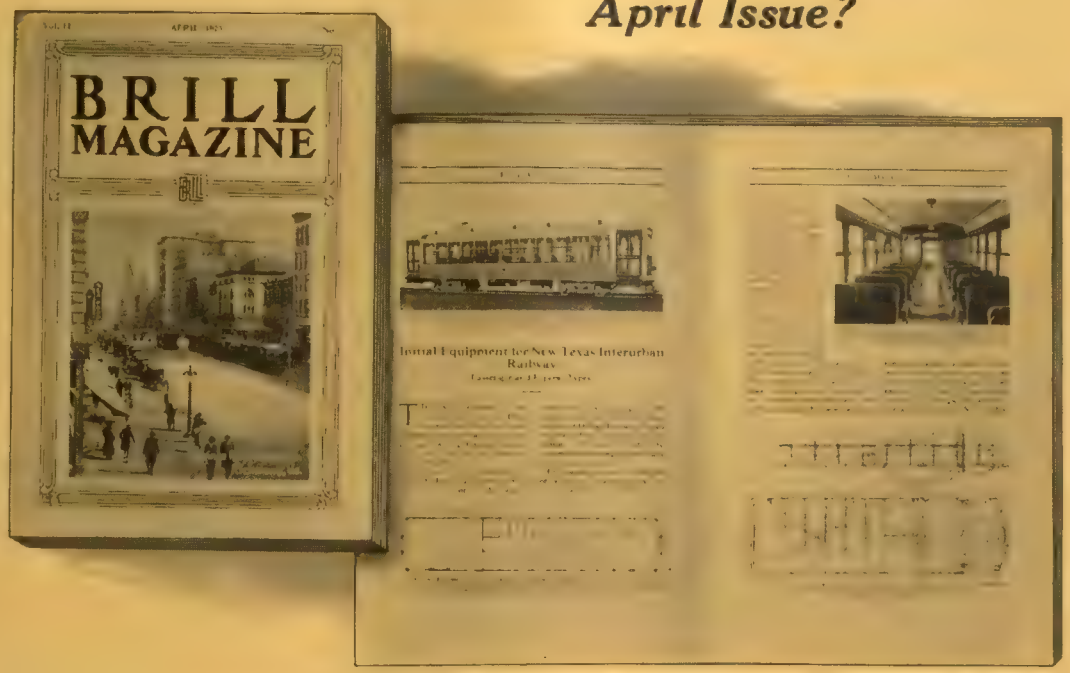


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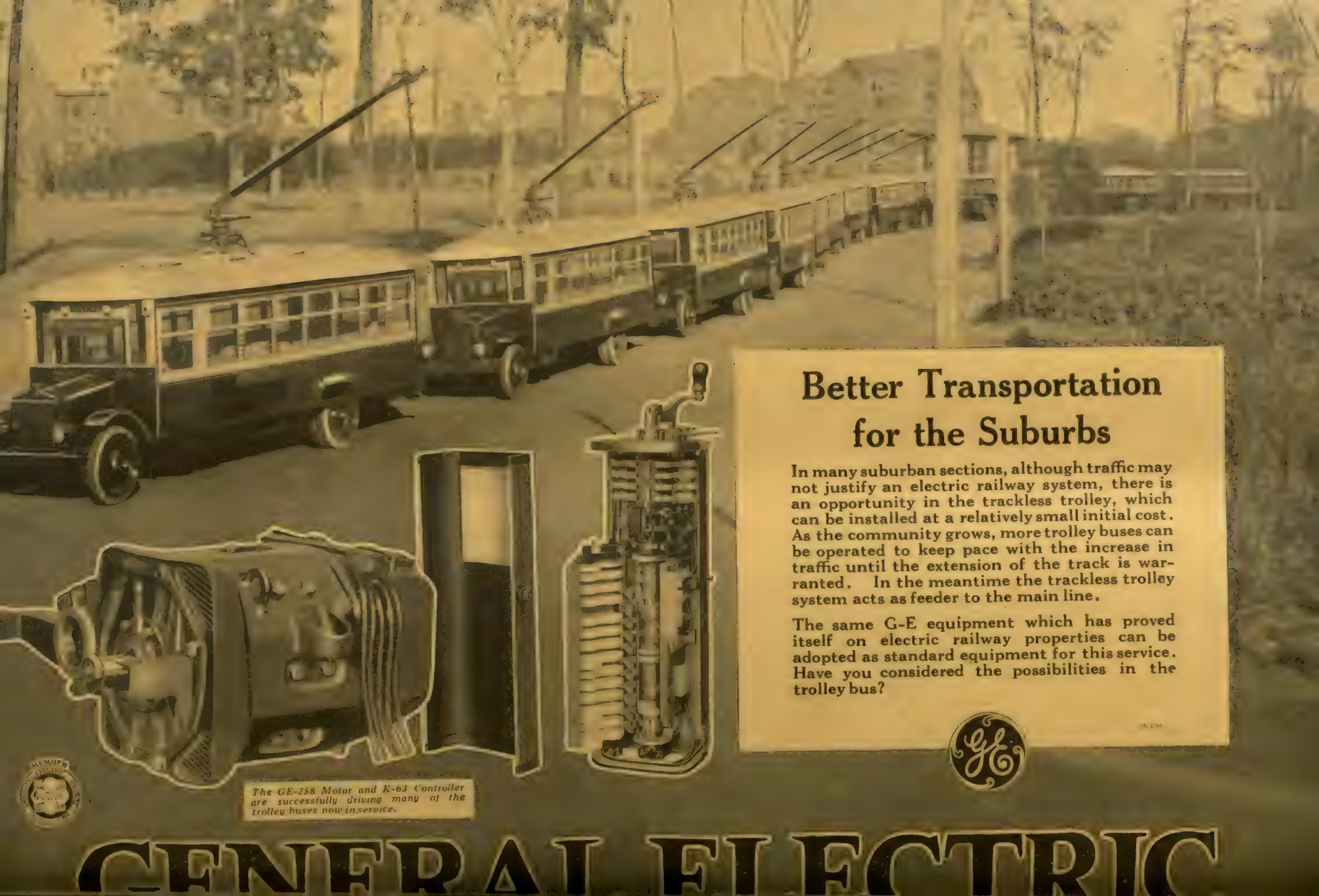
New Rolling Stock Delivered

Every Electric Railway Official interested in rolling stock and its equipment will again find Brill Magazine of valuable assistance in keeping in touch with the types of cars and trucks delivered to and placed in service by various electric railways.

Commencing with the April issue distributed last month Brill Magazine will be published quarterly and mailed gratis to those electric railway officials interested. If you did not receive the April number, it will be sent you promptly upon receipt of an expression of your interest in receiving copies regularly.

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Better Transportation for the Suburbs

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The GE-258 Motor and K-63 Controller are successfully driving many of the trolley buses now in service.

GENERAL ELECTRIC

McGraw-Hill Company, Inc. May 19, 1923 Twenty Cents per Copy

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ELECTRIC RAILWAY JOURNAL



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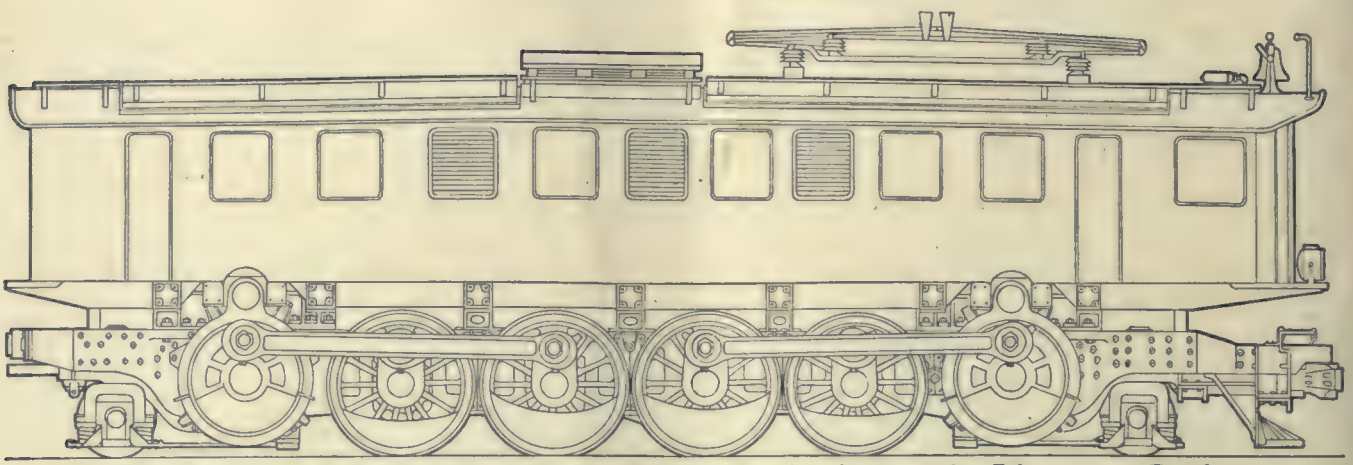
NOTHING pays better dividends than an investment in good track construction. And with Twin Ties the cost per foot is often less than with conventional designs.

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By this electrification heavier tonnage trains will be handled on the 2-per cent grades at 14 miles per hour requiring, at maximum, 20,000 horsepower of energy for the electric locomotive.

Heretofore it has only been possible to concentrate 7,000 horsepower of steam locomotives to handle heavy-tonnage trains over the 2-per cent grades at 7 miles per hour.

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East Pittsburgh, Pa.

Westinghouse

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Shop Talk

"BILL," said the master mechanic to the superintendent, "has this week's JOURNAL come yet?"

"Yes, Joe," replied Bill, "but you can't have it until I finish reading what it says here about safety campaigns. It looks like we ought to do something of that sort here. We had too many collisions last month."

"That's right, Bill. The boys have had a job fixing up the car that got smashed at Four Corners on Monday. The fellow who ran the truck into it must have been crazy."

"I don't know about that, Joe; but I do know the crew were not at fault. Here it says 'the companies have done about all they can with their men.' That's right. 'But the public can be trained so they won't take chances.' I'm going to talk this idea over with the G. M. and see if he can't get something of the sort started here."

"All right, Bill, but don't keep that paper too long. The G. M. has his own copy, so you don't have to hold yours before his nose. I want to see if there are any more of those shop kinks that I can use. We set up the old milling machine the way they did in Providence, and we're boring out our pump cylinders in great shape. Some of those ideas have helped us turn out the work a lot faster than we did last year."

"If you need the JOURNAL so much why don't you subscribe for another copy? Then you wouldn't be taking ours away before I've had time to read it. Here's an article about Toronto's new car storage facilities that I want to look at, so you'll have to wait."

"Guess I'll take your advice, Bill. If I have my own copy I can cut out the things I want and keep them handy in the file."

"Fine, Joe. Well, I'm off to see the G. M. Good-bye."

Circulation of this issue, 7,100

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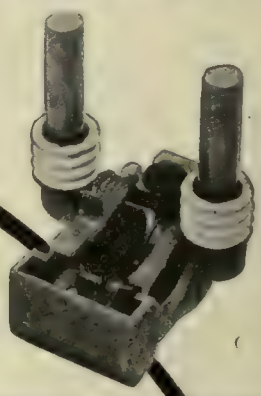
Some Fundamentals In the Construction of Brushholders



Insulated-Bolt Type Brushholder



Detachable-Box Type Brushholder



Closed-Front Type Brushholder



Gauging Brushholders

Making Final Insulation Test at 5000 Volts

In the selection of a brushholder it is important to give careful attention to the details of construction as well as the accuracy of workmanship.

The following points are of primary importance in the construction of a reliable brushholder.

1. It must be well insulated against break-downs to ground.
2. It must be provided with a large creepage surface.
3. Steel pressure springs should be used, as they do not age and lose life in service.
4. Careful machining and checking must be employed to assure the correct neutral location of the brushes.
5. It should be provided with an adjusting mechanism to give the proper spring pressure.
6. The spring pressure should be weighed and adjusted.
7. Flexible copper shunts must be used to connect the contact tip and carbon box, so as to help carry the working current.
8. The inside surfaces of the carbon box should be accurately machined with minimum tolerances allowed so as to prevent chattering but at the same time to provide free movement of the carbons.
9. The carbon box must be accurately machined and gauged to provide from .001 to .003-inch margin over the exact size of carbon.
10. The brushholders must be subjected to a rigid inspection before shipping.

MEMBER ELECTRIC RAILWAY MANUFACTURERS ASSOCIATION

All of these points are included in the construction of Westinghouse Brushholders

W WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

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Portable
Imperial
Incandescent



Maximum Illumination *from* Incandescent Headlights

The 11-inch reflector and universal focusing arrangement in the Crouse-Hinds Type DC series of Imperial Headlights give just about the ultimate in illumination from incandescent headlights.

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Imperial DC Headlights are provided with either mogul or standard screw receptacles. The mogul base type will take 500 watt lamps and project a beam a light comparable to a luminous arc.

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Cases, designed for free ventilation, and made of alloy coated Armco iron finished with two coatings of waterproof baked enamel preclude rust and corrosion.



Type DCS for surface mounting

Imperial Type DC Headlights are completely described in complete headlight Catalog No. 210



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A Keystone Product

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The Keystone Steel Gear Case is a light case, riveted and spot-welded to stand the gaff of the roughest roadbeds. It's oil-tight and dirt-proof. These qualifications can be expected of this gear case.

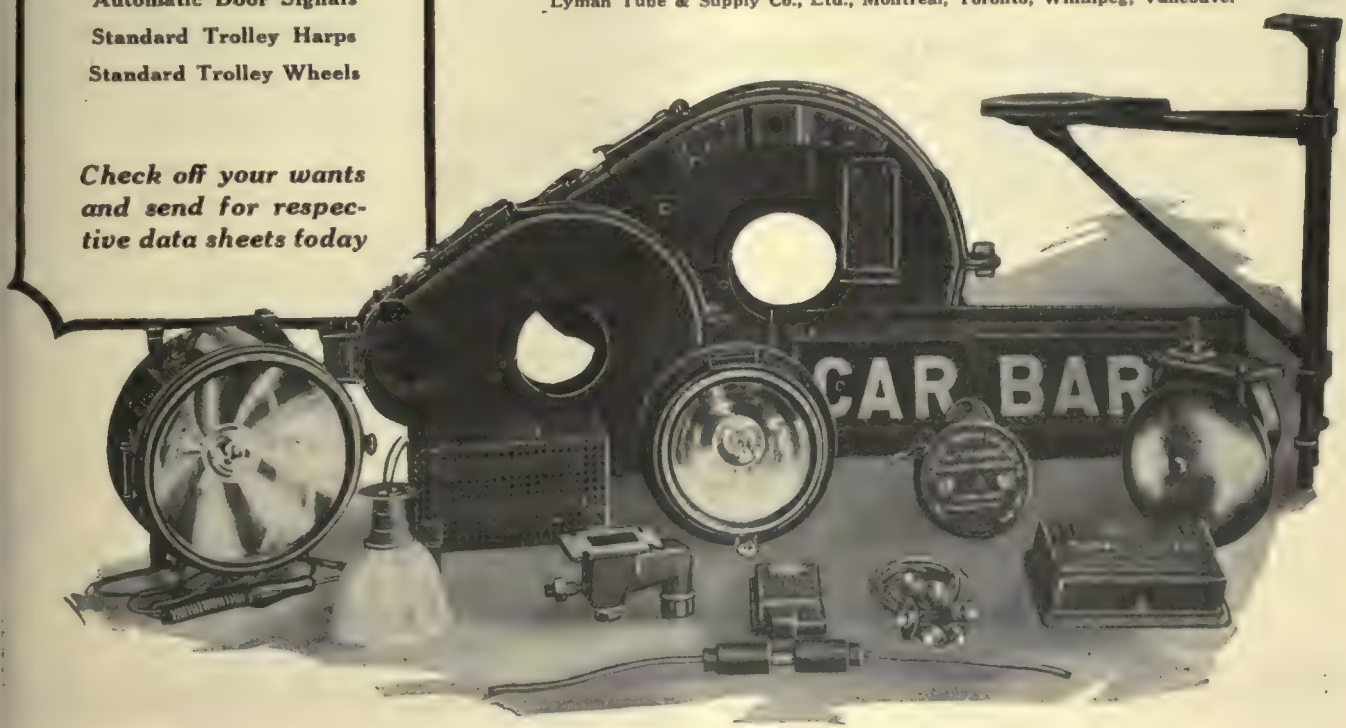
Made for use with all types of motors. Send for data sheets.

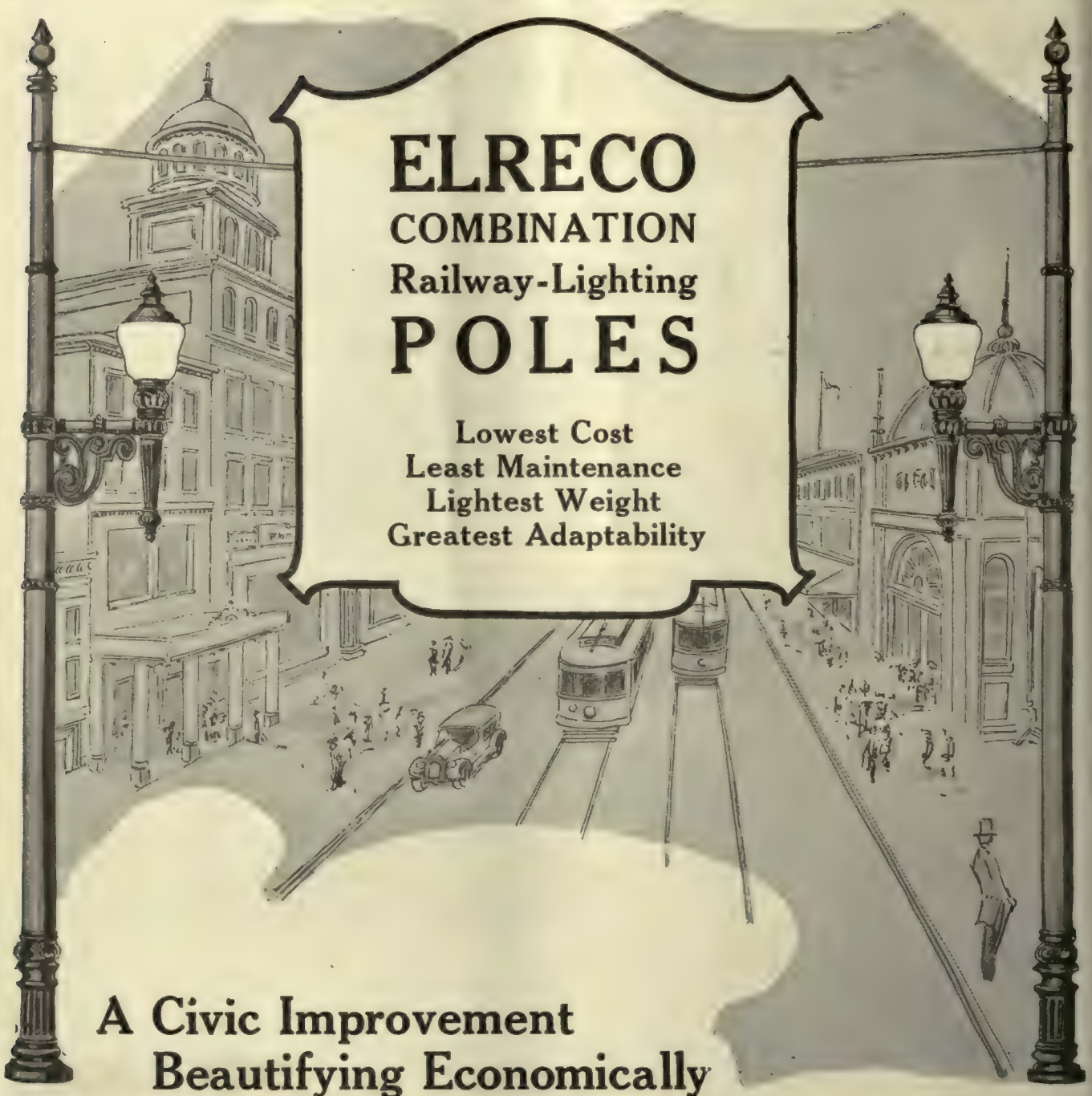
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But here's an installation wiping out a duplication of unattractive irregular lines of wooden poles, and substituting straight, clean-cut steel poles, enhancing the appearance of the city streets a hundred-fold, and cutting pole maintenance costs to less than half.

Railway companies, lighting companies and public officials in many other cities are *getting together* on Elreco Poles. Why not in yours?

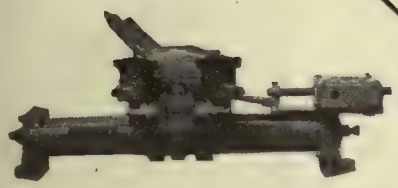
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Electric Railway Equipment Co.
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New York City: 30 Church Street

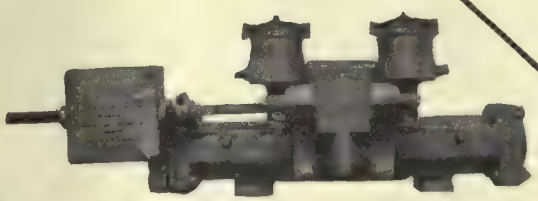
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NATIONAL PNEUMATIC Door Engines

used by leading surface and rapid transit electric railways of America







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Door and Step Operating Mechanism
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Double Duty

The accompanying photograph shows one of the Long-Bell Creosoted Yellow Pine Poles in the distribution service of the Houston Lighting & Power Company, Houston, Texas. This pole is doing double duty. It serves as a dependable support for trolley and power lines. Note its sturdy, clean-cut appearance.

Poles of Long Life!

Long-Bell Poles are treated, full length, with the best grade English Creosote Oil by the pressure-vacuum process. This treatment makes them resistant to decay, fire and other destructive elements —insures long life. Of Long Leaf Yellow Pine, they possess unusual breaking strength.

Long-Bell Creosoted Yellow Pine Poles can be depended upon to properly support all wire lines. Many public utility companies are now using Long-Bell Poles for city distribution. They add to the appearance of any right-of-way. As evidence of our confidence in these poles, each is branded "Long-Bell" five feet above the ground line.

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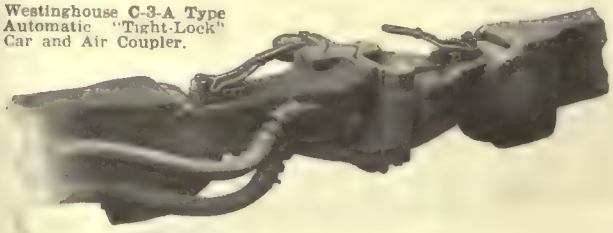
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Westinghouse C-3-A Type Automatic "Tight-Lock" Car and Air Coupler.



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We have an Automatic Coupler for every class of service—one type light enough that it is used on Safety Cars, a type for medium-weight cars and still another type for the heaviest subway, elevated and interurban trains.

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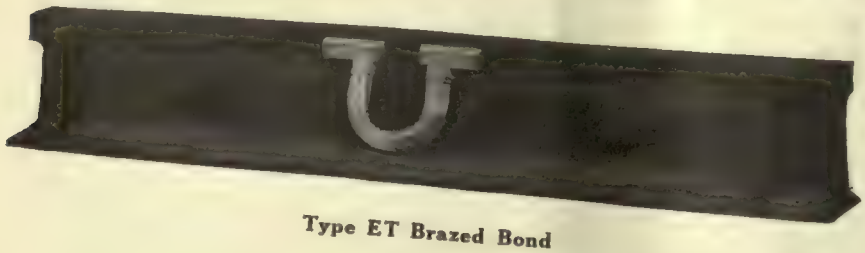
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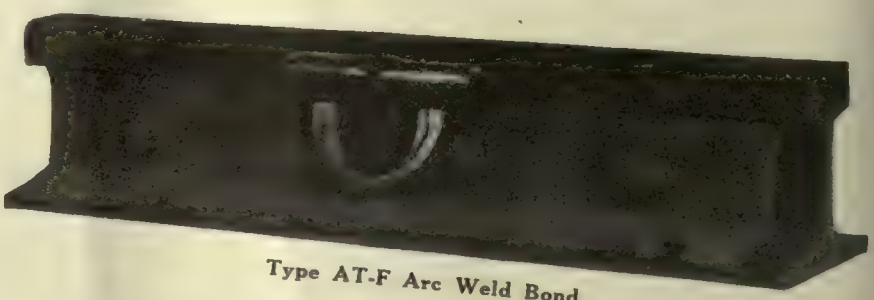
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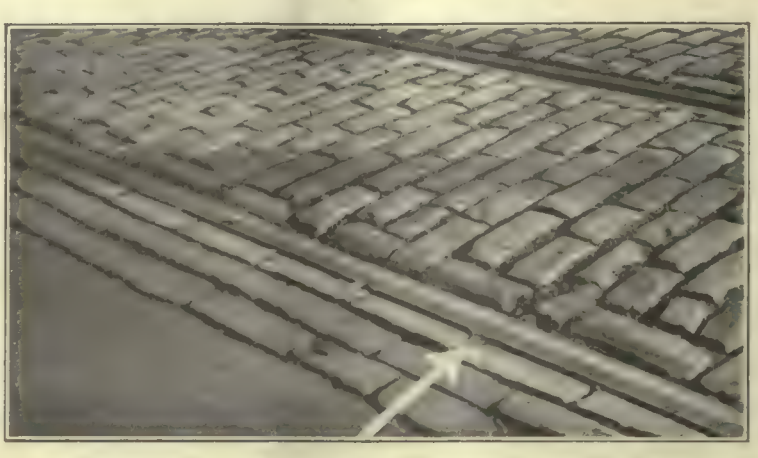
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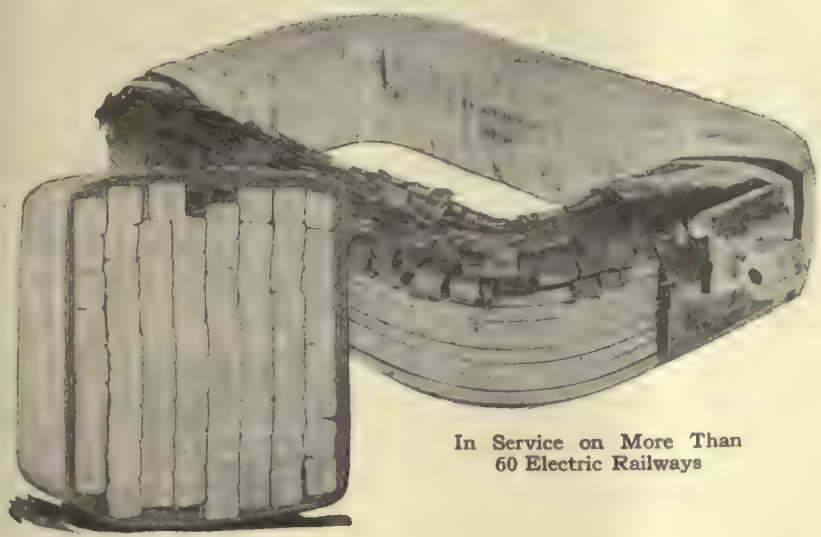
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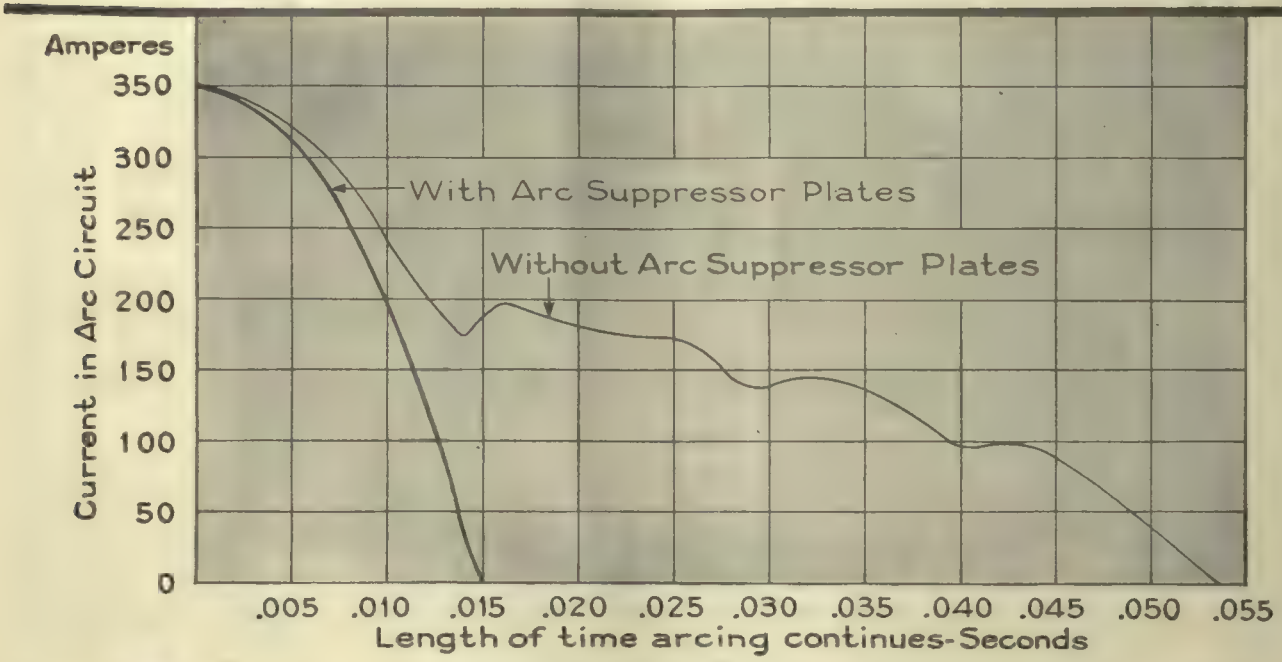
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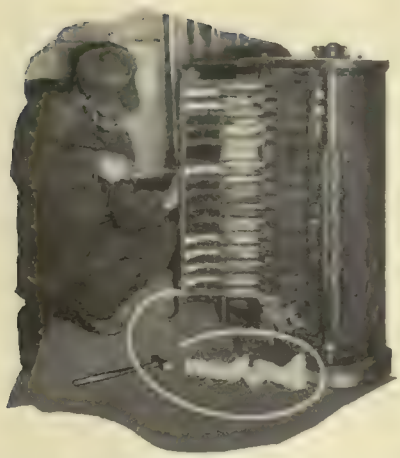
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Consider the value of these auxiliary plates in reducing maintenance costs. They reduce carbonization and eliminate much of the trouble from pitting of contacts. Modern controllers are equipped with them to give better, longer service.

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61
Number 20

Surveys Bring Out Especially Valuable Information

DESCRIPTIONS of current methods and equipment serve a particularly useful purpose when the best features are thus pointed out and made available for adoption by companies which are doing this work less efficiently. In order to visualize and draw conclusions as to the relative value of different practices it is desirable to have many of them described side by side so that the advantages and disadvantages may be picked out readily. With this idea in mind, the ELECTRIC RAILWAY JOURNAL has planned and is publishing a number of articles giving information obtained through a broad survey of methods and equipment used for performing certain operations or maintaining unit parts of the car, line or track.

A survey of the painting practices used by electric railways was published in the Feb. 24 issue. A survey of the methods and equipment used for removing wheels appeared in the March 17 issue, from which it was possible to draw almost complete conclusions on how gear blanks might be standardized to meet all requirements. A third article dealing with truck overhauling is published in this issue. It is believed that such articles are among the most valuable pieces of work the paper can do. They require a great deal of labor and are very expensive to prepare. They are worth special study by the reader.

Good Savings by Improvements in the Old Shop

IN COLLECTING the information relating to methods and equipment used in truck-overhauling work, special attention was given to obtaining the ideas of foremen regarding needed improvements. If a new shop were to be constructed these men felt that a number of improvements should be incorporated, but there seemed to be a lack of progressiveness in working out savings that could be made in the present shop by adopting better methods and tools. This attitude may be partly accounted for by the experience these men have had in various efforts to convince the management that improvements in the old shop would produce a substantial return on the investment.

Many operating officials consider the shops a necessary expense and look with little sympathy on any proposal to put more money into these facilities. The situation in regard to improvements is better when it comes to building an entirely new shop, for then the management wants to incorporate all the latest methods and equipment. But managements not contemplating new shops may well give special heed to the requests with respect to small improvements in present facilities on the part of their men who are constantly studying mechanical maintenance work, for a dollar saved in the shop is a dollar added to net just as much as though it were a dollar increase in revenue. And there is much room for reducing shop costs on the average road.

For example, changes have been made in old shops that have produced surprising results in reduction of time and labor required in overhauling trucks. One shop installed two overhead traveling cranes to serve the truck shop. One of these cranes operates underneath the other and the supporting runways are entirely separate from the original building construction. Thus the strengthening of the building in general was not necessary. Another shop has installed a system of air and gas piping with convenient outlets. Many pieces of work formerly done with hand tools can now be done by special tools, with a great saving of expense. For example, nuts previously removed with hammer and chisel are now removed by the cutting torch.

Orderliness and System in the Truck Shop

THE truck-overhauling shop of any electric railway is a busy spot. The general impression that one carries away from visits to most of these is one of disorder. Truck parts are found scattered over the floor, grease and dirt are everywhere. To move about one must jump over various parts and the visitor feels much safer at a distance. Is all this necessary? The exceptions prove that it is not. Without doubt one of the least expensive improvements that can be made, and still one that will produce important results, is that of systematizing the work and maintaining an orderly truck shop.

Fix a definite location for performing certain work. Take whitewash and mark off the sections on the floor where the work is to be done. See that aisles and passageways are clearly marked and that this space is not encroached upon by the other overhauling work. Use a liberal amount of sawdust over the floor and have it replaced frequently. Have definite places for all tools and see that they are kept in their places when not in use. Arrange the equipment with the idea of expediting the work and plan the various operations for the convenience of the men who do the work.

Men do more work with less effort if confusion is avoided by convenient arrangement. It takes less time and effort to handle material once than to handle it twice. A little thought may produce a better arrangement, speed up the work, and at the same time produce better work. Is there a chance for improvement along this line in your truck shop?

Concentration of Work a Reason for New Shops

AMONG the older shops, especially those in large cities, the consolidation of properties has given the equipment maintenance department a number of shops of which none is particularly suited to the overall maintenance requirements of the present company. In order to use the facilities to the best advantage with-

out extensive changes, it is a common practice to do different classes of work at the several shops. Thus truck overhauling is done at one shop, wheel and axle work at a second, motor repairs at a third, etc. While this uses the individual shop facilities to the best advantage, still it requires a large amount of handling and transporting of equipment. It also leads to a schedule for overhauling equipment which provides for different parts to be overhauled at separate times. This is inefficient as it requires a duplication of some parts of the dismantling and assembling work. The tendency is to do all overhauling of equipment together with painting and car body repairs at one time.

Thus the plan has been in all recent shop layouts to center at one location all the shop facilities for a property. Where the shop work must at present be done at scattered locations this is an added reason for investigating the saving possible with a new shop.

A Good Workman May, or May Not, Make a Good Foreman

FOREMEN are usually promoted from the ranks, a wide-awake management being always on the alert to detect in the workers those characteristics which are needed for the job higher up. The result is on the whole fairly satisfactory, but there is always a likelihood that a man will be promoted simply because he has been a good workman and has a pleasing personality. These virtues are not enough; in fact, while desirable they are not essential. What is essential is the ability to get men to produce and to work harmoniously. This quality is possessed by comparatively few, and is worthy of careful search.

The growing realization of the importance of the foreman is the cause behind the classes in foremanship which are now so common. The war played a part in this, because the rapid expansion of manufacturing produced an abnormal demand for foremen. They had to be made over night. The state and federal boards of vocational education have also influenced the movement. Elsewhere in this issue is an account of a foreman class held in El Paso, Tex., the results of which are typical of what is being done or can be done almost anywhere. Such undertakings either give the foremen a better appreciation of their opportunity or emphasize their unfitness for it. They also tend to bring out the foreman "timber" among the men.

Will Defacement of Cars Disappear with Finer Materials?

STREET railway men know to their sorrow that there is in every community a certain element which seems to take special delight in defacing and damaging public conveyances. There is no real motive behind this. Such vandals destroy simply for their own amusement, without reason. The tendency in the past has been to forestall this kind of vandalism by sacrificing appearance in favor of indestructible material. Usually it has resulted in a less attractive design if not in one which is actually less comfortable for the passenger. This has minimized the maintenance expense, but it has not prevented thoughtless defacement.

An entirely new thought is introduced by the experience of a Mid-Western company. Some time ago this railway commenced de luxe bus operation. The fittings, finish and equipment were selected with a view to elegance of appearance and luxurious comfort. Deep-cushioned seats were upholstered in genuine leather and nickeled fittings used. Some apprehension was felt concerning the way these expensive trimmings would fare at the hands of the general public. Since the inauguration of this service, however, there has not been a single act of vandalism. On the contrary, the public seems to have taken special pains to preserve these attractive fittings.

Is there not a lesson in this situation for electric railways? If experience shows that a satisfactory and attractive interior cannot be made of indestructible materials, why not make one of such good materials that people will be inspired to preserve their fineness? The use of plush seats in the new safety cars of the Chicago, North Shore & Milwaukee Railroad, noted in last week's JOURNAL, is a step in this direction, but only a step. The interior of the new London Underground cars pictured in the JOURNAL for May 5 carried the idea much further. And one American railway is working on plans for new interurban cars that will be finished with plate glass windows and the luxurious upholstery associated with the limousine. Of course, the primary object in each case is to popularize the service, but it is not too much to hope that at the same time vandalism will not be a deterrent to car development.

Seattle System Did Better in 1922

OF MORE than passing interest is the annual report of the Seattle Municipal Railway for the calendar year 1922, presented elsewhere in this issue.

Beginning with the first day of complete city operation, fares were increased by the elimination of cut-rate tickets. A straight 5-cent fare continued for less than sixteen months, when the cash fare was raised to 10 cents, with tokens sold at four for 25 cents. Within six months, on Jan. 9, 1921, the token fare was raised to 8⅓ cents, which rate continued to the end of the period covered by the report.

When the property was given up by its former owners a deficit had accrued, due in no small part to the refusal of the city to allow an increase in fares sufficient to meet rising costs. The city, however, found it necessary to increase fares several times, and even then had an accumulated deficit to Dec. 31, 1922, of $877,491.

The revenue for 1922 was 1.88 per cent less than in the preceding year, being $6,228,103. This was at the rate of 40.2 cents per car-mile. Figures compiled by the American Electric Railway Association show that in 1922 the receipts of 121 urban railways were 45.7 cents per car-mile on average receipts of 6.7 cents per revenue passenger against 8.3045 cents in Seattle. Operating expenses in Seattle were at the rate of 30 cents per car-mile, which is not especially low with 28 per cent of the service given by one-man cars. The average operating expenses of the 121 roads for the same period were 32.8 cents.

That the company showed a net operating income for 1922 amounting to $761,000 after the payment of bond interest is due in large measure to the immunity from taxation enjoyed by the city-owned railway. Nor was paving a heavy expense, as $69,574 was spent in maintaining paving carried in the capital account at $3,040,218. The amount spent on this item during the year was only one-forty-fourth of the first cost, which would seem to indicate that the paving burden was borne largely by other departments of the city.

Truck Overhauling Methods

The Several Commonly Used Practices in Truck Overhaul Are Described as Result of Survey Covering Fifty Electric Railway Shops—The Best Methods to Be Followed and Most Effective Equipment to Be Used Are Discussed—Overhead Crane Provides Most Efficient Handling

THE instructions which are usually issued to a shop foreman or by shop foremen to overhauling crews regarding the work necessary in overhauling trucks can be summarized in a very few words. In effect, these are that the trucks should be overhauled in such a thorough and efficient manner that they will be placed in the best of operating condition and as nearly as possible in their original condition. For a complete overhauling, this means that the trucks must be entirely dismantled. The various parts which can be repaired again must be sent to the machine shop or blacksmith shop, all excessively worn parts replaced, and finally the trucks again assembled and made ready to be placed under cars for service. The work necessary to be done will vary with each type of truck and also quite likely with each foreman that has charge of the overhauling. Through a survey of the truck overhaul shops of more than fifty electric railways, an effort has been made to point out not only the variety of methods and equipment used, but also the most efficient practices.



Overhauling Trucks in the St. Paul Shops of the New York State Railways, Rochester. Car Bodies Are Lifted by Chain Hoists, and Jib Cranes with Air Hoists Serve the Overhauling Floor

The master mechanic of a small or medium-sized road is often forced to work at a disadvantage. He has to develop men who can be changed efficiently from one class of work to something entirely different. Generally, he lacks modern machinery and sometimes is even compelled to use machines which have been discarded by larger shops as being out of date. He has to modernize these machines as much as possible and devise attachments to make them do work never contemplated by their original designer. Yet, despite these handicaps, these master mechanics are usually required to compete with the car maintenance costs shown by very large shops, and it has been found possible for the wide-awake master mechanic to keep his costs down to remarkably low figures considering his equipment.

No two shops perhaps have the same type of machinery or follow out the same methods in overhauling. The various methods, however, can be grouped into several general classes. The methods described in this article are those which have come under observation of the JOURNAL editors while making a general survey of the subjects and which have worked out to good advantage in the particular shops where they are used.

The proper basis for truck overhauling is something that must be decided by each railway for itself. On medium-sized roads a time basis will no doubt be found most convenient, as these roads can then apportion their work and lay it out in advance so that it will not interfere with other work which the same men may be called upon to do. For large systems a mileage basis will no doubt prove the most advantageous, as it is really the mileage made by the equipment or the service through which the equipment passes that in reality determines its need for repairs. There has been a marked tendency during the last few years, however, to group the various overhauling work so that it can all be done at one time. The work necessary for overhauling the trucks, car body, electrical and brake equipment, together with the painting of a car, is then put on the same basis and all equipment is overhauled at the same time. The interval between such general overhaulings runs from one to two years. On very small systems where the cars are few they really become a part of the family. The various shop men learn their peculiarities, and the wear of the various parts and the need for repairs can be readily followed, so that with such roads there is really no necessity for any definite basis of overhauling, and the necessity for doing the work is determined by the foreman or assistant foreman of the overhauling shop.

The work of truck overhauling from the time the car is placed in the shop until it is ready to return to service may be divided in twelve general items. These are: (1) Taking measurements to determine necessary adjustments; (2) disconnecting brake rigging and motor

leads; (3) lifting car body from trucks; (4) placing trucks in position for overhauling; (5) inspection to determine repairs needed; (6) dismantling equipment and parts; (7) repairing various parts; (8) reassembling; (9) running trucks under car body; (10) lowering car body; (11) connecting brake rigging and motor leads, and (12) final measurements and adjustments.

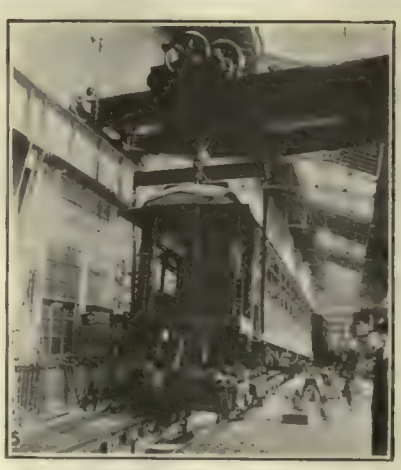
With different conditions and methods several items may be added to these. Thus where car body repairs, painting, etc., are done at the same time as the truck overhauling, and in another department, dummy or shop trucks are quite generally used. The car body is lowered onto these and moved to the carpenter shop or paint shop and is again returned to the overhauling shop when in condition to be mounted on its proper trucks. Some roads clean the trucks by some method or other before any work of dismantling is undertaken. Changes or additions to the equipment can be done to advantage while the car is in the shop for overhauling and the nature of the work may make additional operations necessary.

As soon as the car is placed in the overhauling shop various measurements should be taken to determine adjustments that will be necessary before the car is again returned to service. There seems to be no uniform practice among electric railways in regard to the person designated to do this work. It is frequently done by the shop foreman, assistant foreman, foreman of overhaulers or particular men designated to look after this detail. Cars in city service require measurements of step height, wheel guard height and side bearing height or measurements at the corners of the car body to detect weak springs or defective parts that need attention. Cars in interurban or rapid transit service require measurements of platform and coupler height. A common method is to mark these dimensions with chalk in some definite order on the truck bolster, side bearing or truck side frame. A definite location is desirable as this saves time in looking for them when they are needed. Some of the larger roads have a standard form on which to record measurements and a schedule man to follow this and other important alterations.

The disconnecting of brake rigging and motor leads is usually done by the truck overhauling crew. It is most convenient to have the car over a pit while this work is being done and most overhauling shops have pits provided. The equipment committee of the American Electric Railway Engineering Association devoted considerable time to a study of pit requirements for overhauling shops during 1920, 1921 and 1922 and its recommendations are included in the report on design of typical shop buildings presented by the building and structures committee in 1922. For shops where car bodies remain in a raised position while the trucks are being overhauled, it was considered advisable to provide individual pit space for each car overhauled, with floor space adjacent for the truck work.

One of the greatest problems of the medium-sized shop is the handling of car bodies for the removal of trucks. Information has been collected on methods and equipment used in over fifty electric railway shops. The equipment used can be grouped into six general classes. Jacks of either a mechanical, hydraulic, air or screw type were used for this work in 40 per cent of the shops visited; electric traveling cranes were used in 34 per cent of the shops; car hoists in 14 per cent, and the remaining 12 per cent





Various Methods Used for Removing Trucks from Under Car Bodies

No. 1. Raising a Connecticut Company interurban car for truck removal. A 15-ton crane spans three tracks.

No. 2. Raising a New York, Westchester & Boston car body to remove trucks.

No. 3. By use of turntables in the floor, trucks are removed at the side of the cars in the shops of the New York, Westchester & Boston Railway.

No. 4. Crane room of the Long Island Railroad where car bodies are lifted from trucks.

No. 5. Lifting one end of a car for truck removal in the Wilson Avenue shop of the Northwestern Elevated Railroad, Chicago.

was divided among hoists operating on an I-beam or monorail; suspended hoists of a chain, hydraulic or air type and drop platforms or elevators. In this connection it is interesting to note that of three new shop designs completed this year, Boston uses a traveling crane and both Toronto and St. Louis use car hoists.

In deciding on the best type of equipment for any particular shop some of the points that should be given consideration are: Initial investment, time required for operation, adaptability to other service in the shop, convenience of operation, accident hazard and weight of cars to be handled. For handling heavy cars and equipment such as is used in interurban or rapid transit service, overhead traveling cranes or hoists mounted on I-beams or monorails are favored by most shopmen. This class of equipment has another advantage in that it can be used for handling heavy parts and dismantling or assembling of the equipment in the truck shop and thus be kept in almost continuous service. The initial cost of traveling cranes, however, is more than for the other types. Where ground conditions permit the bringing of cars in over the overhauling shop, drop jacks or elevators afford a convenient means for removing trucks.



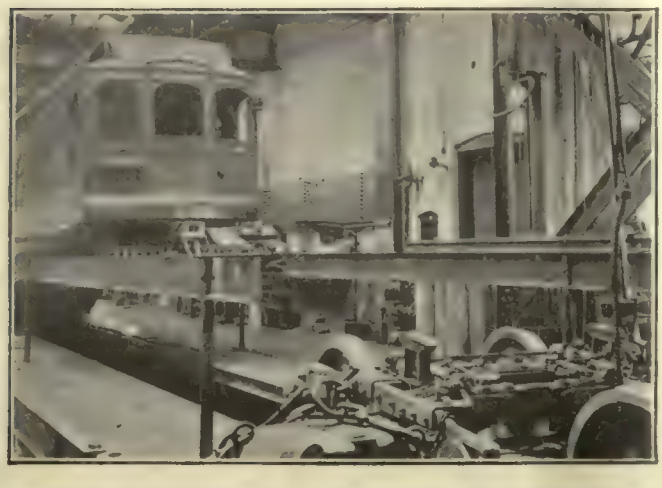
Lifting a Car Body by Means of Two Monorail Hoists in the Harvard Shops of the Cleveland Railway

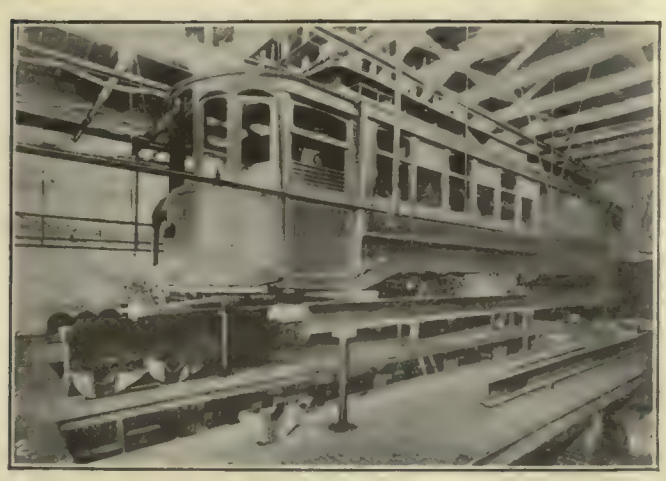
Special Rigging Assists in Lifting Car Bodies

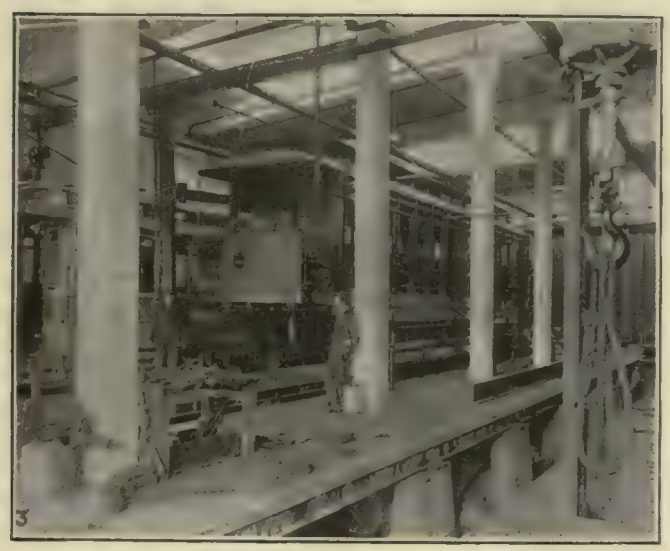
The accompanying illustrations show how cars are handled by the different methods. With overhead traveling cranes a special rigging is quite commonly used. This consists of a yoke extending over the top of the car body with two arms reaching to the bottom of the car. The arms have projections at the bottom to catch underneath the car body. An interesting feature of the Wilson Avenue shop of the Northwestern Elevated Railroad, Chicago, is the method used to store this rigging when not in use. The truck shop is located on the second floor on a level with the elevated structure and holes have been cut in the floor so that the two arms of the rigging can be let down through these. The only floor space occupied by this arrangement is that taken by the boom.

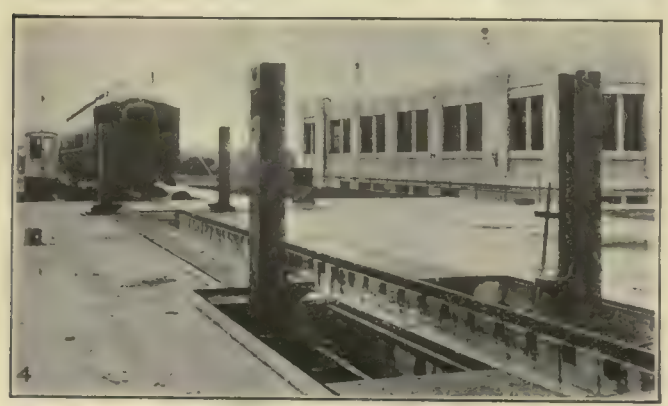
In most shops but one traveling crane is used and the car body is lifted one end at a time and is then let down on horses, which with the cross-supports bring the bottom of the car about 4 ft. 6 in. above the floor. A 6-in. I-beam is a convenient support where cross-beams are necessary. Instead of using the rigging just referred to the cross-beam is sometimes fitted with stirrups so that chains from the crane can be hooked in for lifting. In order to reduce the strain on the car body some shops raise the car body by three operations. One end is raised about one-half the height desired and let down on horses; the other end is then raised the full height and then a second lifting of the first end brings this to the desired height.

The New York, Westchester & Boston Railway uses an overhead crane and removes the trucks from the side of the car. A yoke rigging is attached to the crane for lifting and the car body is lowered onto heavy fabricated hinged supports which drop into position under the car sills. The track used for raising cars and also the one adjoining has hand-operated turntables of a diameter large enough to take a single truck. Before lifting the body, the car is located with the truck to be removed on this turntable. After lifting, the turntable is rotated through 90 deg. and a chain from the crane









draws the truck from under the car to the adjoining track, where the truck is again swung around and drawn by the crane to a convenient point for overhauling. Trucks are replaced by reversing the operation.

The Long Island Railroad has a crane room constructed at one end of its overhauling shops. Two overhead traveling cranes are used for lifting car bodies from trucks so both ends are lifted at the same time. The trucks are moved to the overhauling tracks by an electric tractor, the two trucks of a car being hitched together. The car body is lowered onto shop trucks and then is shifted by the tractor to the body and equipment overhauling section.

Two of the shops of the Brooklyn Rapid Transit System where elevated equipment is overhauled have drop jacks. With these the trucks are lowered from underneath the car body directly into the truck-overhauling shop. Heavy hinged supports hold the car body while the truck is being removed and a shop truck placed underneath. There is sufficient space at each end of the drop jack so that either truck may be placed over this. Traveling overhead cranes serve the truck-overhauling shops.

A drop jack or elevator is used in the Throop Street shop of the Metropolitan West Side Elevated Railroad, Chicago. This elevator is of a hydraulic type and is the most powerful elevator in the city of Chicago, if not in the Middle West. It has a capacity of 100,000 lb. and is operated at a speed of about 12 ft. per minute. To remove a truck the car is run over the elevator until the truck rests on it. Hinged supports are placed underneath the car body and the elevator is lowered with the truck upon it to the overhauling shop. This shop has a raised pit track and the truck is operated by its own power from the elevator to the pit track. The shop has a mezzanine floor where shop trucks are stored. After the truck to be overhauled is removed the elevator is raised to the mezzanine floor and a shop truck is received and placed under the car body. The car is then moved so that the other truck can be similarly replaced. Shop trucks are placed underneath cars only where it is necessary to keep them in the shop over a considerable period. For the mere changing of a pair of wheels or a motor the car is held over the jack until the change is completed on the lower floor.

Car Hoists Are Favored by a Large Number of Users

The type of car hoist quite generally used by electric railways consists of two I-beams or T-rails parallel to the track. The beams are raised to lift the bodies by means of screw supports. These screws are operated simultaneously by shafts and gearing installed beneath the floor level. An electric motor is generally used to operate the hoist, but in some cases these are operated by hand. A shop arrangement quite generally favored where car hoists are used is to provide pits the length of one car and have a car hoist for each pit. Accompanying illustrations show several shops with car hoists and give a good idea of the manner in which equipment is handled. In lifting car bodies short lengths of rail or

The Car Hoist Is Popular for Use in Truck Removal

No. 1. Lifting one end of a car by use of a car hoist in the Syracuse shops of the New York State Railways.

No. 2. Car body resting on car hoist while trucks are being overhauled in the shops of the Spokane United Railways, Spokane, Wash.

No. 3. Car hoist as used in one of the shops of the Connecticut Company.

No. 4. Car hoist particularly adaptable to lifting car bodies of interurban cars.

I-beams are usually placed across the side supports. For general overhauling the car body is ordinarily left in the raised position while the trucks are being overhauled, although the body can, of course, be lowered onto shop trucks and moved to another part of the shop.

On the smaller roads the use of jacks of various types is quite general. This method has the advantage of low first cost and can be used in shops without the necessity for special construction. Most shops already constructed would need strengthening to use some type of overhead lifting device, and in most cases there is insufficient head room for cranes. The method employing jacks requires more time, is tedious for the workmen and has a greater accident hazard than other methods.

Some shops have strengthened the overhead structure sufficiently to install hoists of either a chain, air or hydraulic type. Four of these are needed to lift a car unless some type of monorail construction is used. In general, the present design of shops determines the methods that can be used for lifting cars. For new shop construction, however, most master mechanics favor either traveling cranes or car hoists.

Removing Trucks from Under Car Bodies

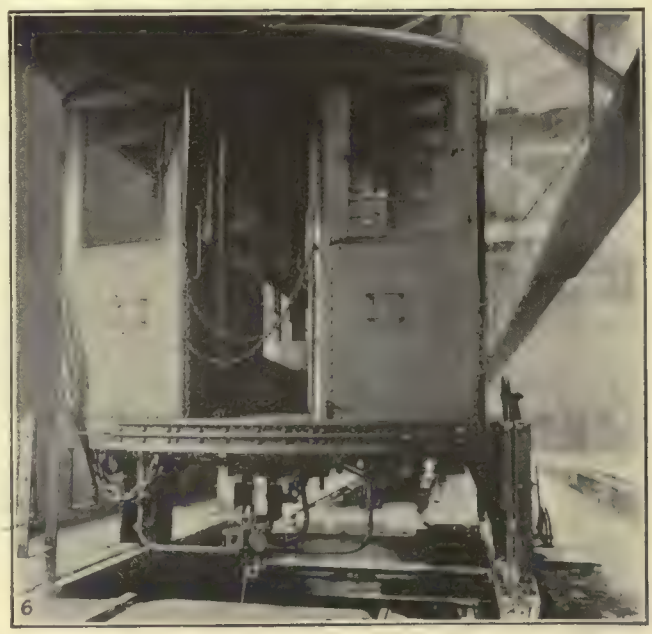
In most electric railway shops the work of truck overhauling is done on the rear of the same tracks over which the car bodies are jacked up. All that is necessary then to place trucks in position for overhauling is to run them out from under the car bodies. With light trucks these can be pushed out by hand without much effort, four to six men being used for this operation. In order to reduce the labor required for this and to overcome the necessity of taking men from other work to help push out the trucks several methods are in use.

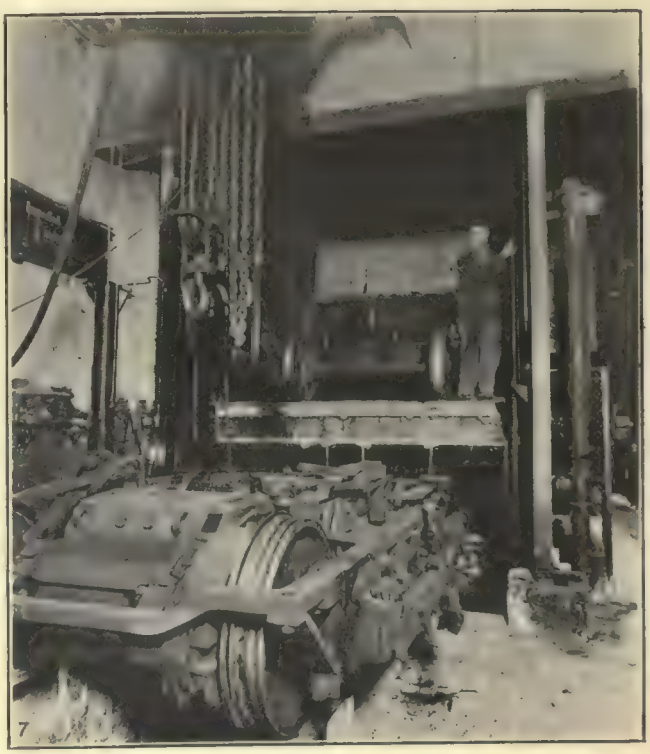
For trucks equipped with motors a common method is to use the motors on the truck to propel it. For controlling the current to the motors a number of different arrangements are used. A controller mounted in a permanent position is a common method. A portable control outfit is used in the Harvard shops of the Cleveland Railway with good results. Other railways make use of the same controller used for operating a transfer table, a car hoist or the overhead electric crane. In addition to these methods trucks are hauled out by traveling cranes or tractors.

In regard to carrying on the work on the trucks themselves, most railways favor raising the truck off the floor so that the overhaulers can do most of their work in an upright position. A common method is to place the truck on low horses, but several shops have specially constructed cradles or truck stands. One of these is described on page 853 of this issue.

The tracks in the truck overhauling shop of the Third Avenue Railway, New York City, are raised about 15 in. above the floor by placing them on wooden supports. For new shop construction a better type which accomplishes the same result is to have the floor depressed around the overhauling truck. The rails can continue then on the same level throughout the shop. Some rail-







The Jack and the Elevator in Truck-Overhaul Work

No. 5. Lowering a truck into the overhauling shop by means of a drop jack in the Thirty-sixth Street shop of the Brooklyn Rapid Transit Company.

No. 6. Metropolitan West Side Elevated car over elevator in Throop Street shops, Chicago, ready to receive shop trucks after removal of operating trucks for overhauling.

No. 7. This powerful hydraulic elevator in the shops of the Metropolitan Elevated, Chicago, has a capacity of 100,000 lb. and is operated at a speed of 12 ft. per minute.



The Truck-Overhauling Tracks of the Third Avenue Railway, New York, Are Raised to a Convenient Height for Efficient Truck Overhauling

ways overhaul trucks over pits, and an accompanying illustration shows the overhauling shop of the New York State Railways in Rochester, where part of the pits are covered over. The work on the top portion of the trucks is then done on the floor level and the trucks are moved over the pits for the underside work.

In lifting trucks onto or off overhauling stands the most satisfactory method appears to be to attach the lifting rigging to the wheels. Strains to the truck frame are thus avoided. Also, where journal boxes are packed, the danger of pressing the waste away from the axles is avoided. A convenient type of lifting tackle will be described in a later issue.

The time required for placing the trucks in position for overhauling after the car is placed in the overhauling shop was found to vary from four or five minutes to thirty minutes per car. With reference to the length of time consumed the various methods appear to follow in this order: Raising by jacks takes the longest, then separate overhead hoists, car hoists, drop jacks, monorail hoists and traveling cranes. The traveling crane method apparently takes the least time. The length of time consumed, however, varies to a considerable extent with the number of cars that are handled in a shop at one time, the weight and type of the car, etc.

In one shop where the trucks for an average of three cars per day are overhauled the following method is used: The three cars are placed on two tracks which are served by an overhead traveling crane. The foreman of overhaulers checks dimensions, while two men disconnect brake rigging and two other men disconnect the motor connections. Two men with a man in the crane then lift the car bodies one after another. The trucks are then run out under their own power and are lifted into overhauling position on stands by the crane. The entire work for the three cars is done in a little less than one-half hour, or an average of about ten minutes to a car.

An idea of the speed obtained through use of a drop jack can be obtained from the fact that in the Throop Street shop of the Metropolitan Elevated, Chicago, the time taken to change a pair of wheels from the moment the car enters until it leaves the shop is but thirty minutes. The work done during this period includes the disconnecting of the brake rigging and motor leads, the lowering of the truck into the overhauling shop and the changing of wheels and replacing of the truck under the car with proper connections so that it can be returned to service.

The Work of Overhauling Trucks

The work of overhauling will vary considerably even in the same shop. One thing that is most essential for efficient work, however, is a carefully worked out system so that each man will know what parts he is expected to look after and is held responsible for. By assigning men to do a special type of work, they become expert in that line and so can do better work. They also give more attention to making good repairs if they know that they are the ones held responsible for improper workmanship which may cause detentions or accidents



Air Hoists Are Used to Lift Car Bodies in the Federal Street Shops of the New York State Railways, Rochester, N. Y.



Removing Truck from Underneath Car Body with the Aid of a Portable Control Outfit in the Cleveland Railway Shops



Trucks Are Moved from Underneath Car Bodies by Their Own Power by Using the Car Hoist Controller in the Shop of the Spokane United Railway

in service. The repair of tools necessary for this particular work should also be assigned to the men using them. As an example of a method in force in one shop one man was assigned to remove all pinions and was held responsible for proper condition of his tools. Previous to the inauguration of this system wrenches for removing pinions were in the blacksmith shop most of the time. With the new system they are now always kept in good repair.

The following division of duties is used at one overhauling shop with good results. This shop averages four trucks and eight motors per day. Motor overhauling is done in a section alongside the truck overhauling. Two overhaulers and two helpers are used for overhauling the motors. One overhauler and a helper take off pinions and reinstall them, take the waste out of the bearings and fit new bearings into the housings. One overhauler cleans commutators, inspects brushholders, repairs motor wiring, installs wiring cleats, thimbles, etc., where necessary and jumps in on any wiring of fields with the other men.

The overhauling of the four trucks per day is done by four overhaulers and four helpers. These men strip the trucks and repair and replace brake rigging, bolsters, pedestals, angle frames, etc., as found necessary. One of these overhaulers is made responsible for the proper suspending of the motors when they are reinstalled.

An outline of the work done in overhauling a truck reads much like a list of truck parts, for all parts require attention. From among the instructions governing this work as issued by various companies the following points have been taken to illustrate important practices which ought to be followed more generally:

Trucks should be examined closely for loose bolts, nuts and rivets. Those in bad condition should be replaced and all tightened securely.

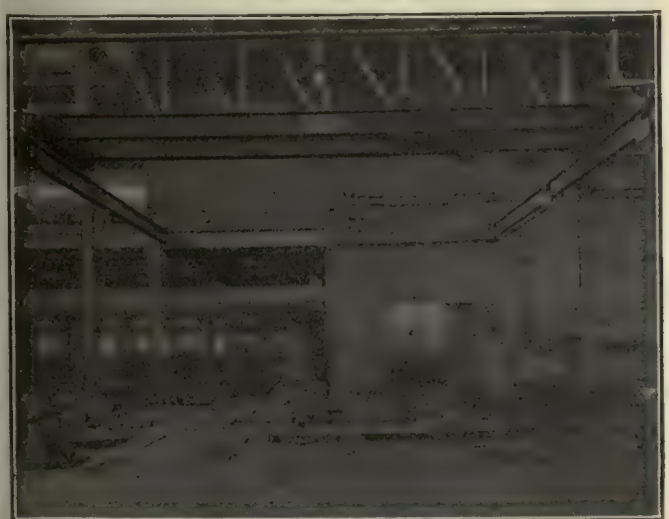
Special attention should be given to brake rigging. Cotter keys must be properly spread and brake release springs adjusted. New brake shoes and turnbuckles should be applied if these are badly worn. Prompt release of brake shoes is important and points where brake rods rub on the trucks and guides should be greased.

Truck side and center bearings should be rigidly attached to the bolster and this should be set by a standard gage.

Wheels should be checked for diameter and flange wear and those with sharp or thin flanges should be either turned down or replaced.

The diameter of wheels on the same axle should be the same to prevent crowding of the rails, with a consequent destruction of flanges and an increase in train resistance.

The diameter of pairs of wheels on the same car should not vary by more than $\frac{1}{4}$ in. Otherwise there is inequality of load on the motors.



A 5-Ton Crane Operated from the Floor Serves the Truck-Overhauling Shop of the Detroit United Railway



The Truck-Overhauling Tracks of the Long Island Railroad Are Served by an Overhead Traveling Crane

Gears and pinions should be checked and renewed if they will not last until the next overhauling.

Journal boxes, covers, bearings, plates, etc., should be inspected and removed if badly worn or broken. Journal bearings should be inspected and thin ones should be replaced.

Axles should be tested in a lathe to detect any that are bent. Any not true, badly worn, or which have made their predetermined maximum mileage, should be replaced.

Axle collars should be checked and tightened.

In collecting information on truck overhauling an attempt was made to determine the number of men required for this class of work. For shops overhauling from four to twenty cars per week an average of about one overhauler and one helper are used per car per week.

The wages paid this class of labor were found to vary through quite a wide range. For helpers from 40 cents to 60 cents per hour is paid and overhaulers receive from 60 cents to 75 cents per hour.

Many railway officials feel that motors should be sent to another department for overhauling. Better work will no doubt result from doing this in a cleaner, lighter place than the truck-overhauling shop. Most roads, however, do such work as taking off pinions, removing waste from the armature and axle bearings, fitting new bearings into the housings, cleaning commutators and brush-holders, repairing motor wiring and cleats, changing fields and painting the inside of motor shells on the floor adjacent to the truck-overhauling work. Where armatures or fields require repairs, however, these are removed and sent to the electrical department or armature room for the necessary work.

After the truck overhauling is completed, of course, the returning of the truck to the car body is taken care of by the same equipment as that used for removing it. In talking with the various men responsible for truck overhauling, all were agreed that if they were building new shops many of the methods and some of the equipment used could be replaced with more efficient methods and equipment. The use of overhead traveling cranes was favored by the majority for new shop construction, and one large railway that is now working on a design for new shops has included a very complete truck cleaning department. The method contemplates the use of large vats to be filled with lye. The trucks are cleaned by placing them in these vats in a manner similar to that used by the New York, New Haven & Hartford Railroad and the Kansas City Railways. These methods were described in the ELECTRIC RAILWAY JOURNAL for March 21, 1914, and March 19, 1921. In this new shop design it is also contemplated that provision will be made for air and gas piping so that rivets can be removed and various parts cut by an acetylene torch. Receptacles for attaching leads for electric welding are also to be included, and finally provision is to be made for repainting the trucks by a spray-painting system after overhauling and before they are reinstalled underneath car bodies. It is evident that many improvements of this character could be introduced in new shops with proper consideration to design, and no doubt some of them could be added to existing shops to advantage.

Toronto Report Shows Surplus

THE editorial comment in the last issue of this paper on the Toronto railway report erroneously referred to the return on the investment as "infinitesimal," because the "net income carried to surplus account" was only $109,468 on a basis of fixed assets of more than $34,000,000. This sum of $109,468, however, was the surplus after fixed charges, depreciation, organization expenses and various reserves had been deducted, and after $425,108 had been charged against redemption of debt (or repayment of capital). For the period covered by the report the system had an operating ratio (including taxes, but excluding depreciation) of slightly less than 68 per cent. Attention is called promptly to this error in order that readers will not be misled.

A Convenient Oil-Handling Arrangement

A SPEEDY and convenient method of emptying oil barrels has been installed at the East Twelfth Street shops of the Buffalo & Lake Erie Traction Company. The various oils used by the railway are kept in large tanks in an oil house separate from the main shop buildings. From the upper part of each tank an intake pipe runs out horizontally through the back wall of the oil house, bends upward at right angles and terminates in a screw cap. The oil is poured from the barrel through a funnel into the opening of this pipe.

On account of the height of the intake it was formerly somewhat of a problem to get the barrel into a position



Barrel Being Raised to Level of Runway

where its contents could be emptied into the funnel. To remedy this difficulty a special rack and hoist have been devised, as shown in the accompanying illustration. The rack is composed of two parallel light-weight rails about 18 in. apart, running horizontally along the back wall of the oil house and supported by several other rails of the same type set vertically in the ground. The axis of the barrel to be emptied is at right angles to the horizontal rails, and the barrel is then at such a height that there is just convenient space to introduce a funnel between the bung hole and the opening of the oil intake pipe.

An inclined approach to the rack is made by two short rail sections which are hinged to the longitudinal members at one end and rest on the ground at the other end. The ends which rest on the ground are connected by a strong tie rod under which passes the hook of a chain hoist.

A full oil barrel is placed on the lower part of the inclined section, and when the hoist is operated the rails are raised until they are on a level with the main part of the rack. The barrel can then be rolled along quite easily until it is located above the proper intake opening.

Armature Practice on Chicago "L"

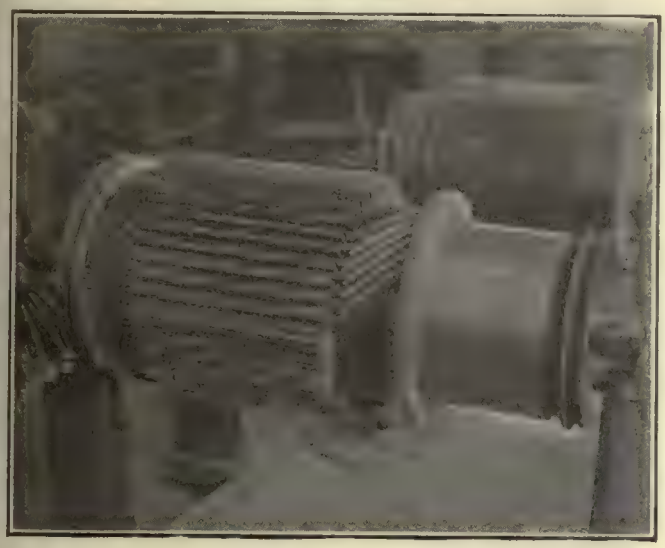
Outstanding Features of the Armature Maintenance Practice of the Chicago Elevated Lines Are Thorough Mica Insulation of the Coils, Heating to Remove Shrinkage and No Patchwork in Repairs

THE secret of proper maintenance of railway armatures lies in the correct selection of materials used in the rebuilding and the careful insulation of bars in the reconstruction. In the armature room of the Metropolitan West Side Elevated Railway shops, Chicago, the process of reconstruction has been gone into to such an extent that a very low record of armature failures has been established. The policy of "no patchwork" has been rigidly adhered to, and has resulted in a material saving of time and labor. Two especially interesting features upon which the engineers of the Elevated lay great stress are complete mica insulation of coils and reinforcement of corner insulation.

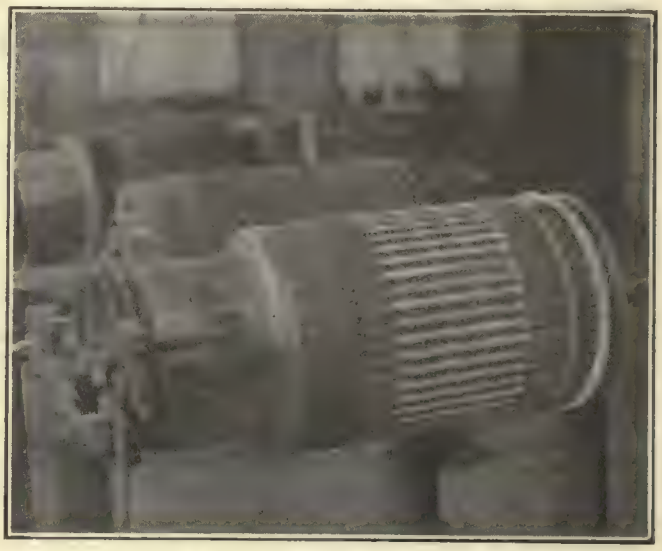
After the coils have been cleaned by the boiling process described in the ELECTRIC RAILWAY JOURNAL of March 3, 1923, page 377, they are then ready for the taping machine. Mica of 0.010 in. thickness is cut by the use of steel templets to fit the shape of the rear and front ends of the coils. Six can be cut at once, and one man working four hours can cut enough of the mica strips to supply ten armatures. These strips are sorted and then placed in a box for future use. The proper shaped mica is laid between bars of the coil and on the outside, and each is taped separately, as far as the bend.

As the coil must be compact enough to allow it to be placed in the slot of the armature and still provide mica insulation throughout, it is necessary to tape with the one-half lap process only every other bar, through the straight portion. Thus, in a three-bar coil the inside bar is left bare from bend to bend on the straight portions, while in a five-bar coil the second and fourth bars are bare. A coat of plastic insulating paint is applied to the bars and they are temporarily clamped together and placed in an oven of 300 deg. F. for one hour. Upon removal, they are pressed together in order to make a solid mass, and clamps are applied to hold the pressure. A layer of one-half-lap oiled linen tape is applied on the straight parts from bend to bend. The coil is again placed in the oven for an hour, after which a layer of one-half-lap cotton tape is applied. Painting with plastic insulating paint and a final period of one hour in the oven completely prepare the coil for use.

As can readily be seen from the foregoing, an important item in the process is the heating to remove all shrinking and dampness. To insure the absence of these factors, a final heating is given the coils just before they are placed in the core. A plan which has proved very satisfactory has been to place ten coils in the oven at once, and as one is removed to be placed in a core, it is replaced by another, thus keeping ten coils in the oven at a time.



Wood Insulators and Mica Core Insulation



Completed Armature Ready for Banding Machine

With the coils prepared in this thorough manner the next step is properly to prepare the core. Often the core has been injured in such a manner that it becomes necessary to press the laminations into shape. This should be carefully done in order to insure a first-class job. The core should also be filed to remove sharp corners and the commutator must be filed and tested for shorts. Insulation consisting of a layer of molding mica 0.025 in. thick, followed by one-half-lap cotton tape and a coat of insulating paint, is then placed on the front and rear coil supports. Insulation in the form of plate mica 0.025 in. thick is next placed in the slots. To reinforce the corners, which are the vital spots in armature construction, as practically all failures occur at this point, a special method has been followed. A piece of molding mica 2 in. x 4 in. of 0.10 in. thickness is heated and formed to the shape of the slot with a die. A piece of flexible molding mica 4½ in. x 15½ in. of 0.025 in. thickness after being formed is shellacked in

the slots, as will be seen from the accompanying photograph. The 2-in. x 4-in. corner pieces are then placed inside the longitudinal mica troughs in such a manner as to produce a double thickness of mica insulation at the corner. The core is now completely insulated and is ready for the coils.

As previously stated, the coils are heated before being placed in the core. This fact cannot be too strongly emphasized, as the heating process is one of the most important in the reconstruction work. The coils for the first or lower layer are now placed in the slots and connections made to the commutator. In the case of the GE-55 motor, the front ends of the coils are separated from each other by wood strips $\frac{3}{16}$ in. thick and the height of the coil. These strips are curved to fit the contour of the core and are only used on the lower layer of the coil. The rear ends of the coils have previously been fitted with clips, and hard mica is placed between bars at a point where the bend comes just before the bar enters the clip. The same use of sheet mica is followed at the commutator ends of the coils. This is done to insure proper insulation at these critical points.

Steel clamps or straps are then placed about the armature at the coil ends and drawn up in order to form a compact mass of the lower level of coils. These clamps are removed after all coils are firmly drawn into position. A test for shorts with 110 volts d.c. is made of the commutator and the coils which are now in place.

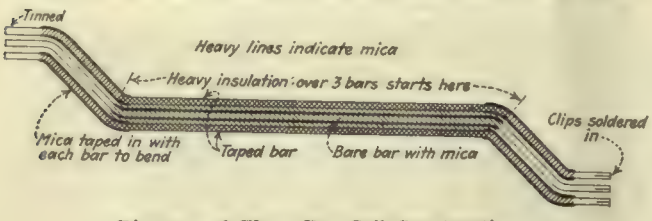


Diagram of Three-Bar Coil Construction

By the plan described, the coils up to this point have been thoroughly insulated from the core and from each other by at least one thickness of mica and in the bends and corners by at least two thicknesses. The insulation between the lower and upper coils at what are known as the coil ends is provided by means of two layers of 0.010 in. molding mica, one layer of 10 oz. duct and two coats of shellac. A ½-in. strip of 0.035-in. mica 15½ in. long is used in the slot. A break-down test of 3,000 volts a.c. for one minute is now given to the lower coils.

The upper coils are placed in the same manner as the lower coils, with the exception of the $\frac{3}{16}$-in. wood strip, which is omitted due to the lack of space. Plate mica is placed between the bars of the coils and asbestos between the rear clips, and the upper coils are soldered to the clips at the rear. However, the front or commutator end is soldered and a copper separator is placed between the leads. After the top lead is driven down, it is wedged in place with a copper slug, which is filed and soldered.

Heating of the armature to take up shrinkage is now accomplished by use of a low voltage and high amperage current which is passed through a completed coil, which consists of both the upper and lower parts. A temporary holder with carbon brushes has been erected on one of the supports to facilitate applying current to the coils for this heating process. The coils are then driven down to the slot with a ½-in. fiber drift, the mica is trimmed off, clamps are applied front and back, and the armature is placed in the oven for twelve hours at a temperature of 260 deg. F. During this period of baking the clamps are drawn down occasionally as the shrinkage is taken up in the coils.

After being removed from the oven the armature is banded on the banding lathe with mica, asbestos and leatheroid, with one layer of cotton on top, forming the insulation under the bands. One coat of amber varnish is then applied to the armature by means of a brush. From continued experiments it has been found that the most desirable and efficient way to apply the varnish is by careful use of a brush. Then the armature is again placed in the oven at 260 deg. F. and allowed to remain until the next morning. One coat of amber varnish is then applied every one and one-half hours until eight coats have been applied. The armature is then taken out of the oven and cooled.

To provide additional insulation to the commutator ends and to insure the armature against flash-over, three layers of boiled linen tape cut 0.010 in. in thickness on the bias with three coats of amber varnish are wound over the retention ring of the commutator. The armature is now ready for service.

In the opinion of the shops department of the company an armature prepared in this manner should operate without an electrical breakdown for at least ten years. On a property the size of the Metropolitan Elevated, which operates 283 motor cars with two motors per car, immunity from armature trouble is one of the greatest factors in securing low maintenance cost of equipment. Previous to this régime of the careful selection of materials and this new thorough method of insulation, it was not an unusual thing to have four armature winders with the customary helpers working overtime from four to five nights a week in order to keep enough armatures on hand to keep the road in operation. Naturally, following the installation of the new system it took time properly to rebuild and reconstruct all armatures. Now this work has practically been finished, and at present only two armature winders with the corresponding number of helpers are required to handle all the work in a comfortable fashion. Most of the work now being done is the rebuilding of armatures which have been damaged due to some mechanical defects in the shafts or spider. A group of nineteen extra armatures is kept on hand at all times immediately to replace any which may have to be removed from service. While the policy of "no patchwork" has been rigidly adhered to with profitable results, an upper coil will be replaced if damaged by some mechanical cause, such as the armature riding on the pole piece. Rigid adherence to this high-class reconstruction work has proved very profitable.

Loss of Head in Pipes

THE formula for loss of head in new, clean wrought iron pipe carrying water, given in the article on page 806 of the issue of this paper for May 12, 1923, should read as follows:

$$H = \frac{0.0319}{d^{1.16}} V^{1.9}$$

where H is the loss in head in feet per hundred feet of pipe, V is the velocity of flow in feet per second, and d is the pipe diameter in feet.



The Asphalt Wearing Surface Being Placed Upon Completed Asphalt Concrete Base

Asphaltic Concrete Base Makes Possible Rapid Paving Program

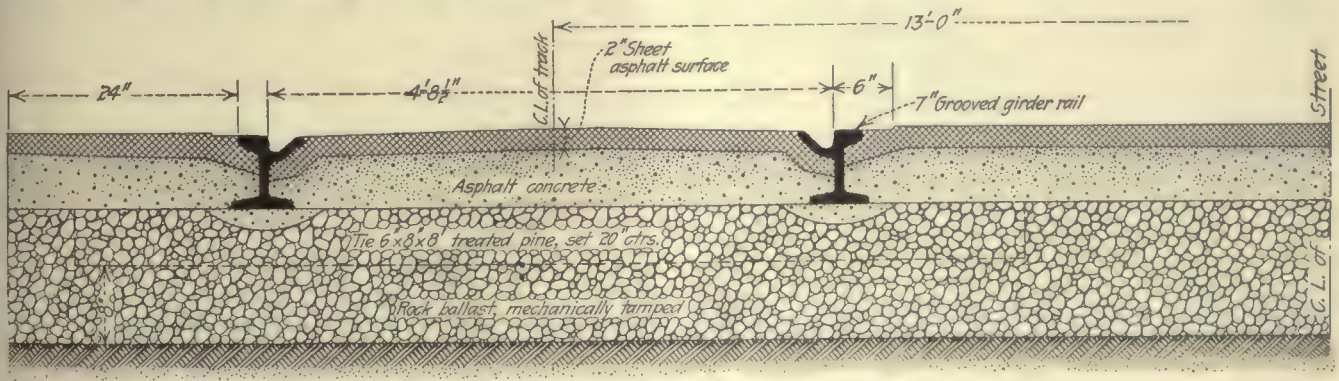
Pacific Electric Railway Abandons Hydraulic Concrete Base Because of Necessity of Keeping Track Under Traffic and Inability to Single-Track Service

By Clifford A. Elliott
Cost Engineer Pacific Electric Railway, Los Angeles, Calif.

THE Pacific Electric Railway, in operating a large mileage of local street car lines in some ten cities of southern California, has been confronted with various improvement ordinances requiring reconstructing and repairing of tracks. Such ordinances specify that the pavement in and about high-T and grooved-girder rail shall consist of 6 in. of hydraulic concrete base and 2 in. of sheet asphalt wearing surface. It has been found to be an impossibility to continue the use of this type of pavement due to street traffic, both automobile and street car, and to the inability to kill one track of a double-track line during the period of reconstruction and paving. A new type of paving was therefore necessary and the resultant type has come as an outgrowth of nine years of experimenting. It has met the approval of the municipalities where permission has been granted to substitute it for the former type.

The company is now using a type made up of an asphalt concrete base with sheet asphalt wearing surface. This type meets all requirements in that it can be successfully placed in and about the rails while the track is in service. This pavement gives a resiliency desired in the track structure, and the after results are most favorable for making repairs to the rail joints and track bonds because of the ease with which the paving material may be removed and replaced. In the old standard, when hydraulic concrete base was used, the depth of the base was 6 in., while the sheet asphalt surface was 2 in. in depth. In using this new type of base its depth is confined to 5 in. and the wearing surface depth to 2 in. The cross-section illustrating this type of pavement indicates how the asphalt concrete base is carried down beneath the base of the rail for a depth of 3 in. in order to provide additional reinforcement for the rail.

Many items enter in the selection of the proper base



Cross-section of Pacific Electric Track with Asphaltic Paving Base



Placing and Rolling, Under Service, the Asphalt Concrete Type of Base

when a paving program is proposed, among them being the amount of interruption to traffic over the section undergoing improvement. Such interruptions cause patrons to desert the street railway line and patronize the jitney bus. Another item to be considered is the public favor the utility will gain when the municipalities see that a first-class type of pavement is being laid in the least possible time. Municipalities as a rule have a tendency to complain of the lengthy time utilized by street railways in repairing, reconstructing and paving their tracks. In support of asphaltic concrete, along these lines, it may be said that twenty-four hours after a section has been laid vehicle traffic may pass over the newly paved area, while there need be no interruption in car traffic during any stage of the construction.

A large amount of the company's trackage in the city of Los Angeles is operated jointly with the Los Angeles Railway lines and is of combination-gage construction. The Pacific Electric Railway tracks are laid to standard gage, while the third rail is laid to narrow gage—3 ft. 6 in. In the paving of tracks of this nature, as well as in snug locations and on special work, a more economical and efficient job may be obtained by the use of asphaltic concrete base than by the use of hydraulic concrete base.

In the downtown business section of this city the



Placing Asphalt Concrete Type of Base Around Special Work

engineering department, in the recent reconstruction of some of its tracks, has found it advantageous for handling track reconstruction and repaving work, where this type of pavement was used, to obtain the city's permission to close up one side of the street at a time, but not for more than one city block. These jobs were handled with a twenty-four-hour force. A number of feet of track was completely reconstructed, the ballast being machine tamped. The engineering department's paving gang, working during the night period, placed the asphaltic concrete base, while on the following day the day paving forces placed the sheet asphalt wearing surface. It was possible to handle these jobs in congested business districts of the city only in this manner. The asphalt concrete base could not be successfully rolled, in accordance with the plans for placing the base, during the daytime, as street car headway in this particular district varied from thirty seconds to two minutes, depending upon the time of day.

With reference to the proved life of this type of pavement, it has been found that a strip of like nature was laid on Main street in Visalia, Calif., in 1894, which consisted of an asphalt concrete foundation approximately 6 in. in depth, with an asphalt wearing surface a good inch in thickness. The city has expended nothing on its maintenance and in June, 1920, it was considered to be in good condition.

The Pacific Electric Railway secures its supply of this type of pavement from asphalt contract plants. It is mixed at the plant under the railway company's specifications and is purchased in terms of boxes, the approximate weight of one box of the mixture amounting to 1,000 lb. The specifications for the asphalt concrete base and asphalt wearing surface are as follows:

BITUMINOUS BASE

(a) Composition.

Bituminous base shall be composed of asphalt cement, broken stone and sand in the following proportions by weight:

	Per Cent
Asphalt cement	4½ to 6
Stone and sand:	
Passing a 10-mesh screen	20 to 30
Passing a ¼-in. screen and retained on a 10-mesh screen	6 to 20
Passing a ½-in. screen and retained on a ¼-in. screen	10 to 20
Passing a 1-in. screen and retained on a ½-in. screen	20 to 40
Passing a 2-in. screen and retained on a 1-in. screen	5 to 25

(b) Mixing.

The different sizes of stone shall be kept in at least two separate bins and 10-mesh material in a third bin. The proportioning of the various sizes shall be done by means of multiple-beam scales.

The broken stone and sand shall be heated to a temperature between 225 and 275 deg. Fahr. and shall be placed in a mixer and the required asphalt cement added.

The asphalt cement shall be prepared for use by previously heating to a temperature of not more than 325 deg. Fahr. and when used the asphalt cement shall not be colder than 285 deg. Fahr. Each batch shall be mixed at least sixty seconds, with the paddles of the mixer running at a speed of not less than seventy-five nor more than ninety revolutions per minute. In addition at least ten seconds shall be allowed on each batch for charging and emptying the mixer.

ASPHALT WEARING SURFACE

(a) Composition.

Asphalt wearing surface shall consist of a mixture of asphalt cement, stone dust and sand in the following proportions by weight:

	Per Cent
Asphalt cement	10 to 12
Sand and stone dust:	
Passing a 200-mesh screen	13 to 17
Passing an 80-mesh screen and retained on a 200-mesh screen	20 to 25
Passing a 50-mesh screen and retained on an 80-mesh screen	17 to 22
Passing a 30-mesh screen and retained on a 50-mesh screen	18 to 24
Passing a 20-mesh screen and retained on a 30-mesh screen	4 to 8
Passing a 10-mesh screen and retained on a 20-mesh screen	2 to 5

At least 15 per cent and not more than 18 per cent of the wearing surface mixture shall be stone dust of the kind and quality hereinbefore specified. Of material passing 80-mesh screen and retained on 200-mesh screen not less than 30 per cent nor more than 50 per cent shall be retained on a 100-mesh screen.

To determine the estimated amount of asphalt required per square foot of area to be placed where double-

track right of way is figured 22 ft. wide and single-track right of way is figured 10 ft. wide, the following requirements are standard:

For asphalt concrete base with 7-in. high T-rail a finished area of about 1½ sq.ft. to a cubic foot of material is produced, while with 6-in. T-rail, the finished area is about 1¾ sq.ft. to the cubic foot of asphalt.

Where only surface asphalt paving is laid an area of approximately 6 or 6½ sq.ft. is covered to the cubic foot of asphalt.

Where the pavement consists entirely of asphalt, the area obtained from a cubic foot of asphalt depends entirely on the manner in which the track is dressed. In estimating the amount of asphalt material required, it is figured where 7-in. high T-rail is used there will be from 8½ in. to 9 in. of pavement; where 6-in. high T-rail is laid, 8 in. to 8½ in. of pavement.

If no paving blocks are used along the edge of the rails, the pavement is laid in two courses, each course being rolled with a 10-ton steam roller, which consequently gives manifoldly more compression in the pavement than ordinary street work.

Where paving blocks are used the bottom course is rolled before the blocks are set and the middle course is rolled with an 850-lb. hand roller, weighted down with about 200 lb. and the surface is rolled with a 6-ton roller, which adds considerably more compression than ordinary street pavement.

Overhead Line Notes from Detroit

Municipal Street Railway Department Is Making Many Investigations with a View to Reducing Maintenance Costs—One Feature Is a Plunger Type of Hanger —Records Show Good Results with Alloy Wire

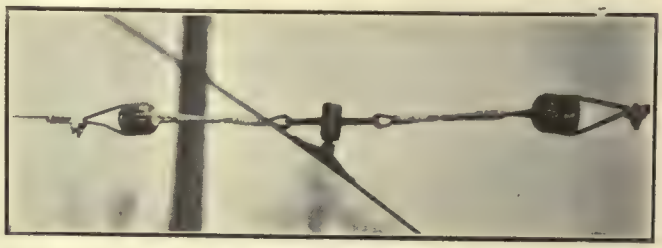
THE Detroit Municipal Railway is conducting several interesting tests of overhead line material and construction. One of these is on what is called a "test line." It is a mile long (two miles of single track) and is equipped with a large number of different hangers, pull-offs and overhead material, as well as different methods of suspension. This line has been in operation since Aug. 1, 1921. It carries a fair amount of traffic, that is, cars with about a five-minute headway. The trolley wire is hard-drawn copper. In addition, the Municipal Railway has installed a section of catenary construction over a thirteen-track steam railroad crossing. This catenary has been in service about two years and is built with a phono-electric trolley wire with copper-clad steel messenger, copper-clad steel hangers and span wires, and with all of the miscellaneous fittings copper plated. The track crosses part of a steam-railroad freight yard in which there is continuous drilling of steam locomotives. The purpose of this installation, as far as the type of material was concerned, was to determine whether this form of construction would withstand the corrosive action of the exhaust gases from the steam locomotives.

In addition, the road has been conducting some comparative tests of phono-electric and hard-drawn copper trolley wire, both in the same service. Two comparative tests have been made, one on Charlevoix Avenue, the other on Myrtle Avenue. In the latter case, the overhead wire on one track is phono-electric and on the other hard-drawn copper.

The electrical department has also been tabulating all breaks of trolley wire, saving samples of the broken wire and listing the information with data as to when and where the wire was installed, the number of wheel movements under the wire at this point, etc. This is being done to produce, if possible, actual data on the limits of economical wear, and also to determine the causes contributing to wear. The railway has also been experimenting with a number of new types of overhead appliances.

Results of These Tests

As a result of the test of the catenary construction over the steam railroad, described above, it has been found that after two years there are absolutely no signs of corrosion of any of the parts, and the electrical engineering department believes that this problem has been solved. Not quite as conclusive results have been obtained from the other experiments, due to the fact that they have not been carried on long enough, but much of interest has been recorded.



Plunger Hanger in Place

The question of trolley wire breakage has proved a serious one on the Detroit system. From May 15, 1922, to April 1, 1923, there were approximately 1,600 trolley breaks on the overhead system, each, of course, meaning a delay in traffic. As explained, each of these breaks is listed and a record is made. Four reproductions of sample records are shown. Records from the test tracks indicate far greater service from the phono-electric wire than from the hard-drawn copper wire. Thus on the Charlevoix line the records from Aug. 1, 1921, to December, 1922, show a reduction in area of the phono-electric of 3.91 per cent and of the copper of 6.64 per cent. On the Myrtle Avenue line, a reduction in area was shown for the phono-electric wire of 3 per cent and for the copper of 9 per cent. This is equivalent on the Charlevoix line to a wear of the hard-drawn copper as compared with phono-electric which is 1.7 times as great and on the Myrtle Avenue line, three times as great. Of course, the life of the two wires would show an even greater difference because phono-electric No. 00 wire has a tensile strength of 80,000 lb. per square inch, whereas the hard-drawn copper, according to the

East Bound Baker between Vermont and 12th Sept. 25, 1922 0.310 — 0.362 Report No. 1,008 Installed May 1918 Cause—broke at center of span Trolley movements, city cars 646,238	North Bound Curve Bates and Woodbridge Oct. 4, 1922 0.200 — 0.294 Report No. 1,069 Installed Oct. 1918 Cause—broke at splicer Trolley movements, D.U.R. 555,078
Beaubien between Kirby and Ferry Sept. 13, 1922 0.239 — 0.323 Report No. 941 Installed June 1916 Cause—broke at Clark splicer Trolley movements, city cars 1,071,252	South Bound Beaubien and Kirby Sept. 29, 1922 0.262 — 0.322 Report No. 1,043 Installed June 1916 Cause—broke at ear Trolley movements, city cars 1,079,700

Reproduction from Trolley Break Records



The Motion Picture Shows the Trolley Wheel in Action
(The sequence follows from top to bottom.)

A.E.R.A. specifications for trolley wire, would be expected to have a tensile strength of between 51,600 lb. and 56,000 lb. per square inch.

Changes in Line Equipment

While instructive so far as they go, these records of tests of trolley wire do not tell the whole story. The tests of the street railway department suggest other directions for improvement. One of these is in some more flexible means of suspension to reduce the wear of the wire under the ear, more perfect alignment at frogs, the strengthening of other overhead appliances and the protection of the overhead construction from blows from a trolley pole which becomes dewired at such critical points as strain plates.

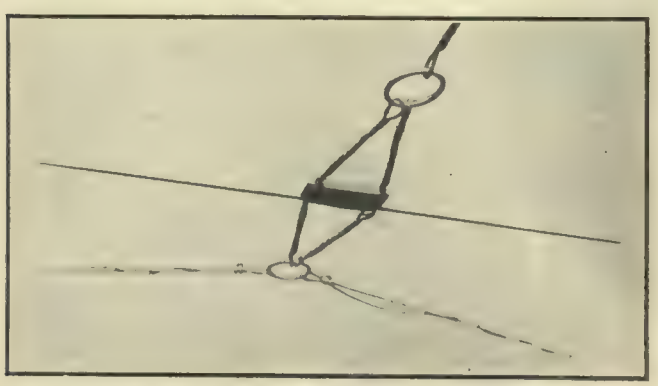
To provide a more flexible suspension a trial is being made of a plunger hanger designed by the electrical department and manufactured by the Hackett Brass & Foundry Company, Detroit.

The first flexible hanger, installed in November, 1921, consisted of a straight plunger bolt working as a piston against a spiral spring in a brass cylinder packed with grease. It was found from experiment that this device did not give the anticipated resiliency because the trolley wire suspended from the hanger weighed about 40 lb. and the pressure of the trolley wheel against the wire was of the order of 27 lb. It will be seen that the difference was more than enough to prevent the wheel from lifting the wire.

The hangers was redesigned and a ball-and-socket joint put in the plunger, the idea being to provide a slight lateral movement, if experience proved this to be advantageous. This modified hanger was tried out for several months and the spring was removed and replaced in the hanger in such a way that the plunger was resting on the spring instead of working against the spring, thereby allowing the spring to aid the trolley wheel in lifting the trolley wire. This scheme has proved to be better than the hanger in which the plunger was working against the spring. Another hanger is being designed, having the same general characteristics as the latter as far as the spring suspension is concerned but with the ball-and-socket joint removed, as it was found that the lateral movement caused an abnormal wear on the side of the ear.

A view of one of these hangers in place is presented.

In an effort to determine exactly the movement of the wire under the action of the upward thrust of the trolley wheel, three series of moving pictures were taken of the passage of a trolley wheel under a hanger. These pictures are not particularly conclusive, but the electrical engineering department is not discouraged. Further efforts will be made to determine just what the effect is of the movement of an upward pressing wheel on a wire held in a partially rigid support, as well as in a flexible hanger.



New Strain Plate and Method of Support

Strengthening the Overhead Parts

To strengthen the overhead parts against blows from a dewired trolley, the Municipal Railway is now beginning the use of steel forgings instead of malleable iron for such parts as pull-overs, bull rings, anchor plates, etc., and is considering their use for frogs and crossings. Specifications have been prepared or are under preparation for a number of detail parts. These steel parts are galvanized to meet A.E.R.A. specification Df 2b. It is believed that steel will be more nearly immune to breakage from blows from a dewired trolley than the malleable iron now available in the market, as shown by tests of an adjustable pressed-steel spring frog which has been under test for more than a year.

In addition to the adoption of steel as a material, the design of some of the overhead parts is being changed. Thus the strain plate is being made 8 in. wide between the eyes instead of 5 in., and it is tied in to bull rings to reduce the danger of a "bootjack" pull, namely, the danger that the dewired trolley wheel and pole will catch in the acute angle usually existing between the end of the strain plate and the span wire.

A double-boss Cleveland splicer is used with the Metropolitan strain plate, instead of a solid ear. In this splicer, the wire is cut and the ends are brought through sleeves to the top of the splicer, where they are held in place by wedge collars.

A test is being made with an automatic strain plate, made by the Slaymaker Welding Company, of Detroit, in which there is a cam which permits the wire to move loosely in the strain plate in normal conditions. But if a break occurs the sudden release of tension on the trolley wire brings the cam into action and it holds the wire from slipping through the strain plate.

Another new device is the Slaymaker adjustable pressed-steel frog. In this the arms can be set at any angle. In fact, they can take their natural angle when the overhead construction is being erected. After the line is tightened up, the arms are bolted in place. One of these adjustable frogs has been in use for a year and ten more have been received and will be installed shortly.

Carrying Safety to the Public—II*

"Safety Week" Has Proved the Best Way to Start a Campaign —Organization of the Committee in Charge Must Be Done Right—Programs, Posters and Parades Are Essential Elements

By C. W. Price
Vice-President in Charge of Public Safety, Elliott Service Company, New York City



This Monument Was Dedicated by the Children to the Memory of Those Children Who Had Lost Their Lives in Accidents

THE first "Safety Week," in 1918, marked the beginning of the successful campaign in St. Louis. During that week there was one death, as compared with twenty-four the corresponding week of the previous year. Since then practically every city which has developed organized community safety has inaugurated its campaign with a safety week.

Experience has proved that more can be done to awaken widespread interest, and by a striking demonstration to convince the people that accidents can be prevented, than can be accomplished in a year of effort along ordinary lines. The one important thing at the start off is to make the public believe that the whole community can be aroused and interested and that people can be led to stop being careless and to begin being careful.

The program of activities for a safety week campaign has been so well worked out as a result of the past five years experience that, given the proper leadership and an efficient organization, practically the same results can be achieved in any community. This is evidenced by the experience of four cities which represent practically every condition found in any city in the United States—New York, the metropolis; Washington, the residence city; Pittsburgh, the great industrial center, and Baltimore, a typical city. In each of these cities a safety week campaign was conducted during 1922, with the results shown in the accompanying table.

*The second of a series of ten articles.

Not a child was killed or even seriously injured in Washington during safety week.

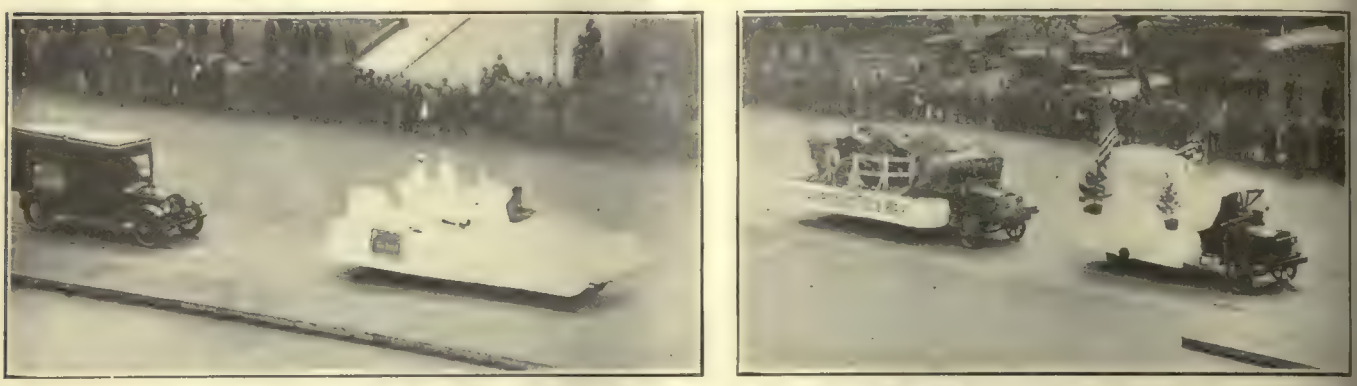
An incident in the Baltimore campaign illustrates in a striking way how an intensive drive will grip the interest of automobile drivers. On Friday of the week, called "Railroad Crossing Day," all of the grade crossings of the four railroads operating within the city limits were watched by checkers and a careful note was made of the conduct of the driver of each vehicle. During the day 60,301 vehicles passed over the crossings. Only 275 failed to observe the rules of safety, or 0.4 per cent. A similar check recently made on some fifty-three railroads in various parts of the United States showed that more than 50 per cent of the drivers were found violating the rules of safety.

It has been found that these features of a safety week drive, which are the most effective in gripping the interest of the people, apply equally well, with slight modifications, to the continuous year-round campaign which follows.

It generally has been found advisable to form a temporary organization called a safety week committee to

ACCIDENTAL DEATHS

	Safety Week, 1922	Corresponding Week, 1921	Per Cent Reduction
New York	24	70	65
Baltimore	2	9	77
Pittsburgh	9	22	60
Washington	2	6	66



The First Prize Exhibit, by the War Department, Consisted of These Four Floats Depicting "Perils of Peace"

conduct the week's campaign, and out of the good timber discovered then to form the permanent organization.

It is highly essential that a man be selected as chairman of the committee who has a talent for leading campaigns, a man who can command the enthusiastic co-operation of large numbers of people. The second essential is that one man, in the capacity of manager or secretary, should be employed to give his entire time to directing the campaign. Such a man, if thoroughly acquainted with the experience of other cities, will be able, at a minimum cost, to organize those activities which will secure results. Most of the items on a successful program do not cost money, but cost effort in securing volunteer co-operation.

The outline which follows includes fourteen activities, each one of which occupies a vital place in the program and plays a distinct part in reaching and interesting the public:

1. *Proclamation.*—A proclamation should be issued by the mayor, setting apart the week as "Safety Week" and urging the co-operation of the people.

2. *Monument.*—First in Baltimore and then in New York, Pittsburgh and Washington, a temporary monument, beautifully designed, was erected and dedicated to the memory of the children killed by accident during the previous year. On this monument were inscribed the number and ages of the children killed and a pledge by the people that such a sacrifice would in the future be made impossible. The dedicatory services consisted of addresses by the Mayor and other prominent citizens, and a program of music. In Washington ninety-seven little children dressed in white robes, representing the number of children killed the previous year, each deposited a flower at the base of the monument. The effect has been the same in each city. It has served graphically to bring to the attention of the public the seriousness of the accident situation and has proved a most effective event to start the safety week.

3. *Safety Sunday.*—In each church on the Sunday marking the beginning of safety week the minister should be urged to preach a sermon on safety, emphasizing the duty of every Christian to help conserve life. A safety lesson should also be taught in the Sunday schools.

4. *Schools.*—The following program should be carried out in all public, parochial and private schools:

(a) A safety lesson should be taught each day from a printed lesson furnished by the safety week committee, each lesson covering some one serious hazard to children.

(b) Each child should write a letter to his parents regarding safety week, and receive a reply.

(c) Safety patrols should be appointed in each room to warn the children, especially when dismissed.

(d) Safety mass meetings should be held in all school buildings, with a speaker furnished by the speakers' committee.

(e) Safety posters should be placed in the entrance and on the outside of each building.

5. *Slogan.*—"Don't Get Hurt" has proved by far the most effective slogan that has been used. This should be given wide publicity and played up in big red letters on posters and billboards.

6. *Publicity.*—The publicity campaign should begin a month before the opening of safety week. As each feature of the campaign is developed to a point where it can be announced, an article should be prepared outlining fully the activity. By this means there will be built up in the minds of the people an adequate picture of the scope and purpose of the campaign. This is absolutely essential to securing proper co-operation.

The following will suggest the sort of material which



At Left—The Treasury Department Display Emphasized the Bad Effects of Hurry. At Right—The Girls of the Interior Department Had a Good Motto

the publicity committee should prepare and furnish to newspapers:

Daily program (printed in a box).
News items.
Two-minute talks to mothers, signed by chief of police.
Interviews with prominent citizens.
Reports of talks given by speakers.
Picture showing hazards to children on the streets.
Daily score of accidents.

7. *Posters.*—If a safety week campaign is to be effective it must be visualized, must be so presented, that at every turn it will confront the driver and the pedestrian and remind them of safety.

This can best be accomplished by the use of posters bearing the slogan "Don't Get Hurt" printed in bright red on white paper. These posters are much less expensive than picture posters and are quite as effective.

The most striking poster display can be made by placing large posters, say 25 in. x 38 in. in size, at some 100 strategic street intersections. This can be done best by using thick sheets of heavy beaverboard arranged in



This Washington Railway & Electric Car Made a Tour of the City Each Day During Safety Week

triangular form around a lamp post or trolley pole at one of the four corners of the sidewalk. On the face of each side of the triangle a large poster, say 24 in. x 42 in., bearing the slogan "Don't Get Hurt" should be pasted. This display, if properly placed, will be seen by every driver and pedestrian. The same poster should be placed at all gasoline-filling stations, on public buildings, including schoolhouses; on vacant billboards and at highway entrances to the city.

A poster, say 18 in. x 24 in. in size, bearing the slogan should be carried on the front and rear of each street car. The co-operation of the owners of all commercial vehicles, including taxicabs, buses and trucks, should be secured so that they will carry triangular posters bearing the slogan on both sides of each vehicle.

Marking the streets at the crossings with broad white lines and with a large footprint in which is stenciled the slogan have proved to be most effective in visualizing safety.

8. *Parade.*—A spectacular parade, if properly organized, will impress large numbers of people who might not be reached by the other appeals. It should be short and snappy. Each municipal department, the principal industries, public utilities and civic bodies should be represented by floats. The one point to be emphasized is that each float should visualize in a graphic way the safety idea.

9. *Police.*—The police, if properly interested and instructed, can do much to make the streets safe during safety week. This interest can best be secured by arranging to have a speaker appear with the chief of police at one roll call at each station during the week preceding safety week. During safety week each policeman should wear a large celluloid button on which is inscribed "We are helping to make ————town safe."

10. *Industries.*—Each industry should be requested to do four things: (1) Blow the whistle at nine o'clock on the Monday morning of the safety week; (2) conduct a drive among its employees; (3) arrange for a mass meeting of employees, with a speaker from the speakers' bureau, and (4) place large posters at the entrances to the plant.

11. *Speakers' Bureau.*—A speakers' bureau, if properly directed, with a group of good speakers can do much to reach and interest the more intelligent citizens.

A printed leaflet containing data and suggestions should be furnished each speaker. It is comparatively easy to arrange for a speaker to appear before any luncheon, club or women's organization and in the larger industries before or during safety week.

12. *Motion Pictures.*—The motion picture houses should be asked to run slides with the slogan "Don't Get Hurt" and also safety films.

13. *Radio.*—Speakers should be furnished for all of the radio stations, and safety talks should be broadcast each evening.

14. *Scouts.*—The Boy Scouts and Girl Scouts delight in taking part in a safety week drive. Each scoutmaster, a few days prior to the opening of safety week, should instruct his troop regarding safety and ask each scout to pledge himself to set an example of safety, to warn others, and to save human life if the opportunity offers. Each scout should be furnished with a large button inscribed with the motto, "We are helping to make ————town safe."

A most spectacular stunt which has been used effectively in several cities is to have fifty boy scouts take the place of fifty traffic policemen for one hour at noontime on one day of the week. Boy scouts have also done effective service as guards for pedestrians, one being located on each of the four corners of the principal street intersections.

El Paso Foremen Profit by Vocational Training

By William Rouse
General Foreman El Paso Electric Railway, El Paso, Tex.

UNDER the auspices of the vocational department of the El Paso public schools, in co-operation with the state and federal boards for vocational education, the El Paso Electric Railway recently conducted a successful course in foreman training. It was started Sept. 14, 1922, and ended Jan. 4, 1923, meetings being held on Monday and Friday evenings each week from 7 to 9 o'clock. In all twenty-six meetings were held.

The course was divided into two main sections: (1) Processes of operation and (2) man factors. In each section the material was analyzed to bring out the cost elements, the supervisory and managerial responsibilities of the foreman, and ways and means of obtaining the co-operation of the working force, higher standards of production, increased production and a lower cost of production.

The conference group was made up of members of the mechanical department of the railway. The company furnished a classroom and cigars for the men, and in addition paid the local portion of the salary of the conference leader who had charge of the discussions.

The benefits which we have derived from the work are noticeable in the way in which the foremen handle their men, the way in which the men go about their work, and the way in which they co-operate with other foremen in the department.

At the completion of the course all members of the class expressed appreciation of the work and asserted that it had given them a different viewpoint as to a foreman's responsibility. Each member was given a certificate showing that he had successfully completed the course and had attended 80 per cent or more of the meetings. These certificates were distributed at a dinner given by the company in honor of the occasion, indicating that the efforts of the men to improve themselves were appreciated by the management.

Training for foremanship is essential in the electric railway industry. The experience which we have had on the El Paso property illustrates some of the general principles involved in this matter of vocational education. There have been three stages in the development of this education in this country, of which the first, the training of executives and technical experts, has received attention for a relatively long time. The second stage is concerned with the training of the working force, and is of comparatively recent development. The third stage, which is just beginning to receive attention, is the training of the man who stands between the executive and the work, namely, the foreman.



Foremanship Conference in Session, El Paso Electric Railway

The training of executives and technical experts has been done in our colleges and technical schools, and is well taken care of. Since the passage of the federal vocational education act, known as the Smith-Hughes law, rapid progress has been made in the efficient training of the working force. Today almost every city is conducting day trade schools, part-time schools and evening schools for the training of industrial workers.

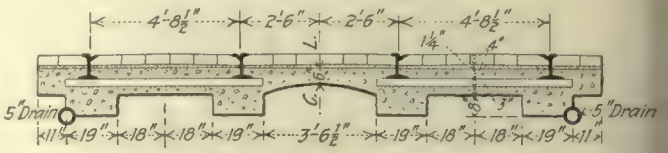
However, a chain is never stronger than its weakest link, and if we have trained executives and trained workers, then we must have trained foremen to make up an efficient industrial organization.

Industrial leaders have come to realize that the training for foremanship must be entirely different from that for executive responsibility or industrial work. The qualifications required in a good executive or an expert worker would not cover those necessary in an efficient foreman. For this reason foremanship courses are being conducted by many industrial organizations.

The method of putting on a foremanship course is to bring together a group of men having supervisory and managerial responsibility and to have them discuss their problems in accordance with the conference plan. The conference leader guides the discussion but does only enough talking to draw out the ideas for discussion.

Steel Tie Track in Youngstown Has Stood Hard Wear

SEVEN years experience with solid concrete and steel-tie construction has convinced the Youngstown Municipal Railway that this type of installation is the most satisfactory for tangent track. All new work, therefore, is being designed along these lines. Nearly



Concrete Construction with 134-Lb. Rail

9,000 ft. of double track was laid on Wilson Avenue in 1916 with monolithic steel-tie construction, and since that time almost no repairs have been needed.

The tangent track is built with 14-in. concrete foundation below the rail. International steel ties are used, together with 9-in., 134-lb. Trilby rail. The paving is of 4-in. Bessemer brick blocks laid on a 1¼-in. cushion of sand. All joints are thermit welded. On curves, however, wood ties are used and the joints are not welded. A 5-in. tile drain carries off the water.

The trolley service on this track is fairly heavy, as all city cars, seventy-eight in number, pull out and pull in via Wilson Avenue. Moreover, there is a five-minute headway all day with safety cars, which drops to a two-minute headway in the rush hour, the trippers being heavy two-man cars. Prior to 1920 the all-day service also was operated with large cars, although not on such a short headway as prevails with the present safety cars.

A few joints pulled apart during the first winter after the track was laid, but since then there have been practically no joint failures on the tangent track. An exception should be noted, however, in the case of one joint exactly on the crest of a little hill, which pulls apart regularly once a year when the weather gets cold. With the monolithic construction there has been less trouble than usual because of water getting into the paving.

Since the completion of the Wilson Avenue job, track has been laid with the same type of construction on other streets, and it has proved uniformly satisfactory. A minor variation has been introduced by the use of 7-in. Trilby rail, and the depth of the trench for the foundation has been changed from 8 in. to 4 in. In some places the tile drain has been omitted. However, the monolithic construction with steel ties has been closely adhered to, and new work is being similarly designed.



Track in Good Condition After Seven Years of Service

Equipment Maintenance Notes

Testing Car Air Reservoirs

New England Company Has Developed a Routine Procedure Which Insures Maintenance in Good Order of This Important Part of Car Equipment

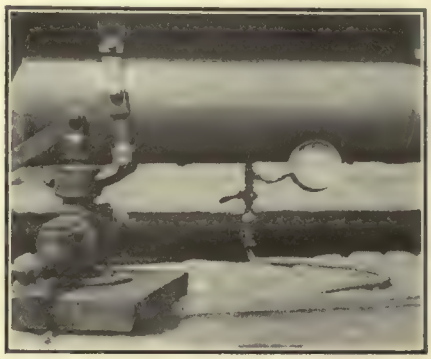
BY W. C. BOLT
Superintendent of Rolling Stock and Shops, Eastern Massachusetts Street Railway, Chelsea, Mass.

MAINTAINING car reservoirs in a safe condition is considered of sufficient importance by the Eastern Massachusetts Street Railway to warrant more than the usual superficial examination for defects. Accordingly, this company has included a hydrostatic and hammer test as a part of the regular car-overhaul schedule.

Each air tank is subjected to a water pressure test at 100 per cent above the working pressure, and the entire surface of the tank is hammer tested to determine the general condition of the shell. The test has been particularly valuable for ascertaining the condition of tanks in service for five years or longer, many such tanks having been found worn thin under the supporting straps or to have developed leaks in the seams.

Tanks with minor leaks in the seams are brazed, retested and placed back in service, provided the body is in good condition. Those with body defects, including thin shells, are renewed.

The accompanying illustrations show the apparatus used in making this test. The reservoir is disconnected from the air system and one end is plugged. A ¾ in. bent pipe, inserted at the opposite end and extending to the top inside, permits removal of all air and indicates when the tank is filled with water. The tank is filled from the bottom, through a small hand water pump connected to the city water supply.



Equipment for Testing Air Reservoir with Hydraulic Pressure

Submit to Rolling Stock Department
Chelsea Office

REPORT OF HYDRAULIC PRESSURE TESTS ON AIR RESERVOIRS

Car No. *Date*

Tested at
(Shop or Carhouse)

Size	Tank	Description	Working Pressure	Tested Pressure

Remarks:

Size	Tank	Description	Working Pressure	Tested Pressure

Remarks:

Size	Tank	Description	Working Pressure	Tested Pressure

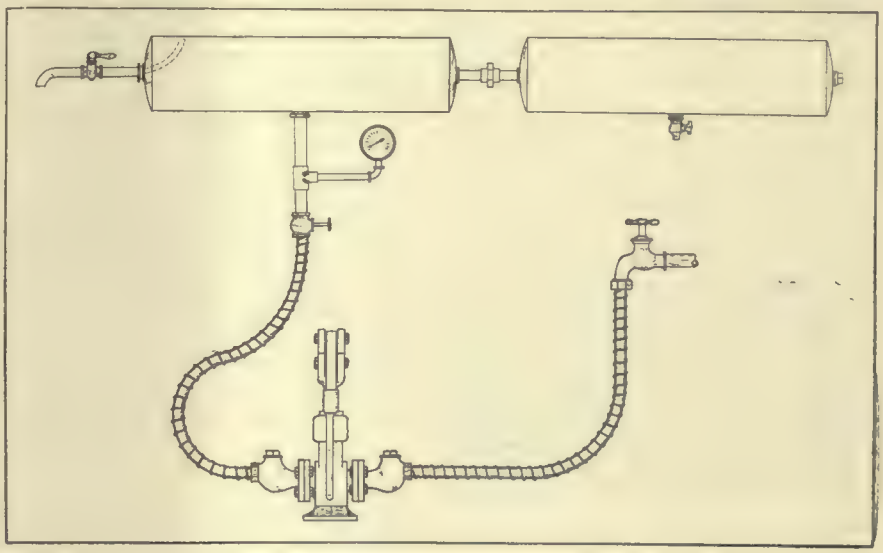
Remarks:

Signed,
Air Reservoir Inspector

Signed,
General Shop Foreman

NOTE:—Under "Remarks" state condition of tank as found by test, describe defect, if any. Indicate under this heading any tank renewal.

Form Used for Recording Results of Test



The Hydraulic Test Shown Graphically

FORM P 956

CAR NO.

NO TANKS	SIZE	DATE IN SERVICE	DATE OUT SERVICE	WORKING PRESSURE	TESTING PRESSURE	DATE TESTED	DATE TESTED	DATE TESTED

CAR RESERVOIR TEST RECORD
EASTERN MASSACHUSETTS STREET RAILWAY COMPANY

CAR NO.

DATE TESTED	DATE TESTED	DATE TESTED	DATE TESTED	DATE TESTED	DATE TESTED	DATE TESTED	DATE TESTED	DATE TESTED

CAR RESERVOIR TEST RECORD
EASTERN MASSACHUSETTS STREET RAILWAY COMPANY

Face and Back of Record Card for Reservoir Test

After the tank has been filled, a few strokes on the hand pump build up the tank pressure to the value desired. A shut-off cock located between the pump and reservoir is then closed, maintaining the pressure on the tank until the examination by the inspector has been completed.

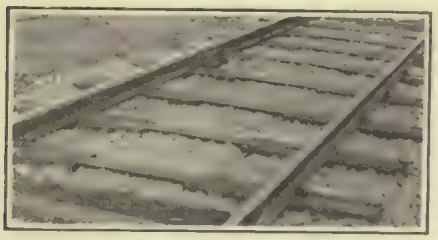
Reservoirs which have been tested are stenciled, indicating the shop at which the test was made, the test pressure and the date, arranged as indicated below:

150 lb.	TESTED Chelsea Shop	10-20-22

The reservoir inspector is required to submit a report, describing the condition of each tank and indicating the repairs or renewals made, and this information is recorded permanently in a card file.

Old Rails Used in Tie Construction

THE accompanying illustration shows a type of tie construction used to a limited extent by the Lehigh Valley Transit Company on its Easton division. Under this plan old rails with wooden side pieces are used as ties, and a tie is made 6 in. deep by 8 in. wide. The wooden pieces fit into the web of the rail and around the ball at the bottom. The running rail is bolted to the section of rail used in the tie, the nuts having lock washers and rail clamp pieces underneath. The wooden side pieces are bolted to the rail and are used to give a wider tamping surface.



Old Rails with Wooden Side Pieces Used in Tie Construction

This type of construction also provides for the desired resiliency and makes the operation less noisy. Another advantage of using the short side pieces is that they can be treated more readily by creosote methods than can ordinary tie sections. The short wooden pieces can be renewed without disturbing the old rail centers, and one man can remove the side pieces and install new ones without difficulty.

Three Simple Signal Systems

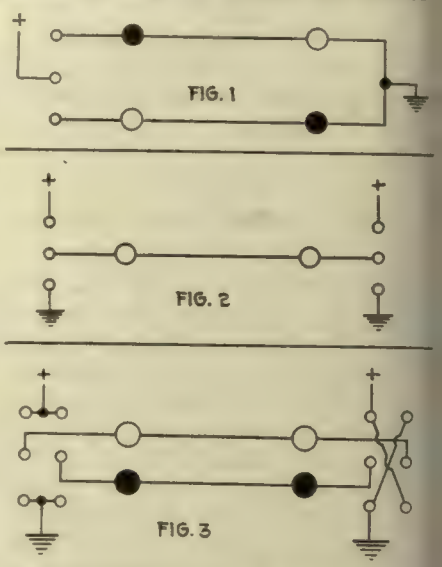
By G. H. McKelway
Distribution Engineer Brooklyn Rapid Transit Company

WHILE the use of automatic signals on electric railways has increased greatly due to the improvement of the systems on the market, yet there will always be places where manually operated signals will be useful, such as for temporary signaling, or where the first cost must be kept low. As electric railways must use electric current to operate cars and as most lighting is by means of incandescent lamps, the type of signal most easily installed and maintained is that in which the signal indications are given by the lighting and extinguishing of lamps using trolley voltage.

Because of the comparatively high voltage of the circuit, usually five or six lamps are burned in series, although the entire five or six lamps are not installed in one cluster at one end of the block but are divided, with three at one end and two at the other. The lamps at the far end of the block can thus be used to signal cars coming from that direction and those at the near end to control the movements of following cars and also to indicate to the trainmen operating the signals that the signals have acted properly at the far end.

The accompanying diagrams show three methods of connecting up such signals for the protection of cars operating over a single-track block. Fig. 1 is for use under circumstances where an inspector or station agent is located so that he can throw the switch which sets the signals at the end of the block. Each circuit is made up of red lights at one end and green lights at the other, and the lamp current is controlled by a single-pole, double-throw switch operated by the man in charge. If he cannot see the lamps at the ends of the block, one or two of the lamps from each circuit should be placed where he can see them so that he can assure himself at all times that the signals are properly set and that the lamps are burning.

The scheme shown in Fig. 2 requires but a single signal wire paralleling the trolley, and all of the lamps used are of one color, which should be either blue or white. Red lamps should not be used, as they would give a clear indication if one of the lamps should be burned out or become broken. The lamps in this scheme, as well as in the scheme shown in Fig. 3, are controlled by switches operated by the crews of the cars. If a motorman, upon reaching the signal, finds the lamps burning, indicating that the track ahead is clear, he throws the double-



Diagrams of Manually Operated Signals

Signals shown in Fig. 1 are for use where employees other than car crews are available. In Fig. 2 the circuit requires but one wire. The scheme shown in Fig. 3 insures definite indications.

throw, single-pole switch to the other position. He thus extinguishes the lights, and proceeds. When he has reached the other end and cleared the block he throws the switch at that end to its other position, which relights the lamps and indicates that another car can enter the block.

The fact that the lights, when out, may indicate either that the block is occupied or that one of the lights has gone out, and therefore that the indications are not always definite, is an objection to this plan which is overcome by the scheme shown in Fig. 3. In the latter two signal wires must be run between the ends of the block, and double-pole, double-throw switches are required. This plan, however, gives positive indications and if the lamps do not light up it is known that there is trouble in the circuit. Therefore there need be no delay before starting to make repairs.

The lamps in these circuits are operated by the train crews in the same manner as with the scheme shown in Fig. 2, except that by throwing the switch to the other position the lamps are lighted and the other circuit of lamps that were burning before the switch was changed are extinguished.

The great trouble with all systems

where the switches are controlled by train crews is the possibility that they may also be altered by some mischievous persons and thus give wrong indications. The only way to prevent this is to lock up the boxes containing the switches so that unauthorized persons cannot tamper with them. Train crews will then need keys to these boxes or else switch handles which can be inserted through holes in the boxes, so that the switches can be thrown while the boxes are still locked.

Protecting Guy Wires

WHERE guy wires run down to the ground it is frequently necessary to install some warning device so that persons passing will not run into them. The accompanying illustration shows a light, neat protection that has been used with beneficial results. Instead of the familiar piece of pipe or wooden boxing, the wire is protected in this



Galvanized Iron Protection for Guy Wires

case by a long, narrow piece of galvanized iron with the ends bent to inclose the guy wire and the whole bent partly around it. The protection is held in place by means of clamps which pass through holes in the iron and fasten below the wire.

The guard illustrated was a protection provided in a high-class residence section and in this case it was painted green so as to blend with the surrounding foliage. In some localities where it is desirable to make the protection more prominent it no doubt would be better to paint with a color which would be more conspicuous. White is particularly desirable as it can be seen more readily after dark.

Truck Stands Reduce Overhauling Time

THE accompanying illustration shows a type of truck stand used by the New York Municipal Railway Corporation in its Thirty-ninth Street shop. Trucks are placed on these for overhauling in order to bring the parts of the truck to a convenient height so that the workmen can accomplish their work with a minimum of physical exertion and a considerable saving in time. The



Truck Stand Enables Workmen to Accomplish Their Tasks with a Minimum of Physical Exertion and Time by Working in an Upright Position

use of these truck stands also provides space underneath for doing work which otherwise would require the placing of the truck over a pit, and thus additional handling is saved.

The two top members on which the truck wheels rest are constructed of standard T-rails. These are fastened together by cross members at the ends. Standard angles 2 in. x 6 in. in dimensions are used for this purpose. The feet or supporting members are constructed of ¾-in. x 6-in. iron plates which are bent to give the necessary floor support and to provide a means for riveting to the T-rails. The corners of the framework are further strengthened by gusset plates. As constructed, the truck stand is 12 in. from the floor to the top of the rails. The ends of the rails are bent upward so as to do away with the danger of the truck sliding or rolling off the framework.

The Roadmaster Has the Right-of-Way

"WHEN are we going to have our picnic this year, Tom?" asked Charlie Riter, the clerk of the general manager of the Jinxville Electric Railway, as he greeted Fairweather, the roadmaster, one fine May morning. "Seems to me we ought to be planning for it soon, before the weather gets too hot."

"You're right, Charlie, it's too bad that our heavy traffic on Memorial Day makes most of us work extra hard that day, or we could go then. I'll take it up with the chief right away. Is Mr. Redfield in this morning?"

"Yes, he's in his office, Tom; go right in."

Fairweather knocked on the G.M.'s door and heard the cheery "Come in," which always made the fellows feel that they were welcome.

"What's on your mind?" Mr. Redfield asked, as Tom entered. "Picnics," the latter replied. "Don't you think we ought to be getting our plans laid? Our people kind of feel out of it on Memorial Day when they have to work hard to give everybody else a good time. If they knew a picnic of their own was coming off soon the case would be different. The blow-out we had last year was a great success. Remember that potato race between Ole Olson, the machine shop lathe hand, and "Whistlin' Dick Singer? Some race, I'll say; I laugh about it yet."

"All right, Tom. I guess the boys deserve an outing, the way they have been pulling together this spring to get the road back in shape. Why don't you head up a committee to get the thing going? I'll ask O'Neill to represent the line department; Bill Gainway can serve for the platform men, Jones for the shop and my clerk, Charlie Riter, for the office force here. If that's all right, it's up to you to get busy."

"I'll get busy, all right. Can I spend a hundred dollars or so on posters, prizes, etc., to help the thing along?"

"Yes, the company will put up a hundred, and your welfare association would probably like to help, too. I'll put up a cup personally for the best all-round athlete in the bunch—provided he isn't too lame to work the next day. Bill Gainway will arrange for specal cars. When will you have the picnic? Or shall we call it a field day?"

"Early in June, I think. There seems to be a picnic spirit in the air around about Decoration Day. I'll get my committee together tonight at the house and we'll lay some plans. Thanks for that cup. I know the boys and their families will appreciate it."

Mirror Saves Current in New Edinburgh Destination Signs

THE practice of the Edinburgh Tramways, Scotland, is to indicate the destination of its cars by colored panels and large numerals prominently displayed in a route number box. Painted tin slides are used by day, and at night transparent glass slides through which shines the light of two electric bulbs



Route Number and Color Mounted Conspicuously at Top of Car



Box Open, Showing Position of Lights and Diagonal Mounting of Mirror

inside the box. Half the face of the box is devoted to the number, and the other half is divided into two small color panels, because the large number of routes makes it necessary sometimes to use two colors to identify a line. Both of the electric lights in the illuminated route number box are placed in the color half, and the numeral in the other half is lighted only by reflection from a mirror. It is claimed that the use of a mirror placed at an angle as shown in the accompanying illustration has saved the use of two additional electric lights.

Stripes Show Location of Fire Apparatus

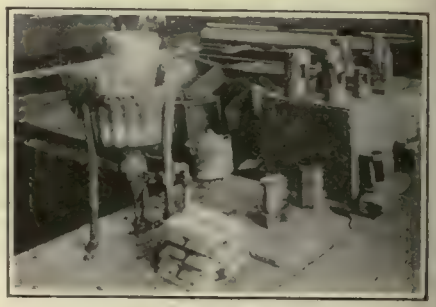
ACCORDING to the insurance rules, every carhouse must be equipped with a specified number of sand pails and extinguishers for fire protection. The value of this equipment depends largely on its instant availability when a fire threatens, as a delay of even a few seconds to locate the fire apparatus is dangerous.

In order that the fire fighting equipment may be quickly located by the men in an emergency, the Beaver Valley Traction Company, New Brighton, Pa., at its Junction Park carhouse has adopted a novel method of indicating the position of extinguishers and pails. The correct location for each of these is indicated by a red space approximately 18 in. square, painted on the white wall. When the house is filled with cars, it may not be possible to see these red spaces, so red stripes are painted vertically upward from the location of the apparatus to a point near the roof. A broad stripe is used to indicate an extinguisher and a narrow one a sand pail. The upper ends of these red stripes may be seen above the car roofs, and the apparatus is located without difficulty. These stripes are so prominent that there is no excuse for delay in finding the equipment.

When the fire equipment has been removed, either for fighting fire or for other purposes, it may or may not be returned to its place. These red spaces and lines are so prominent that they help to overcome carelessness in keeping the equipment away from its proper location, as even a casual inspection will indicate the absence of any equipment.

Making Bearings of Frary Metal

THE Lehigh Valley Transit Company, Allentown, Pa., uses Frary metal for all types of bearings. This is melted in the ladle in the gas furnace shown at the left in the accompanying illustration. In the melting equipment there are two pipes, one for air and one for gas. Both are regulated to give the desired flame. All kinds of bearings are cast in molds similar to the one shown at



Equipment Used for Pouring Bearings at Allentown

the right for armature bearings.

As a result of the use of this metal, together with the method used for making bearings, the company has overcome many bearing troubles.

New Equipment Available

New Circuit Breaker for Electric Railways

THE General Electric Company has recently developed a new line of hand-operated inclosed circuit breakers, known as type M R 22.

Superseding the M R 10, 11 and 12 types of circuit breakers, the new



Circuit Breaker with Easily Removable Arc Chute

units are superior mechanically and are 6 lb. lighter. They are of particularly rugged construction for railway service, with simple parts easily adjustable and readily accessible for repairs or inspection.

An interesting feature is that the arc chute may be removed without tools by raising a latch inside the box cover which releases the chute. The arc chute is also equipped with an arc suppressor plate which reduces the volume of the arc blowing into the car.

Association News & Discussions

Electrification Largely a Financial Problem*

By W. R. Stinemetz
Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

TRANSPORTATION today is one of the most important and essential business enterprises of the country. We have a great network with 253,000 miles of track, 65,000 locomotives and 2,500,000 cars. In the month of January, 1923, the gross earnings of the railroads were $500,810,000, with net earnings of $93,280,000, on a valuation of about nineteen billions of dollars.

American railroad development has been made with the steam locomotive, and it will no doubt for some years to come be the chief motive power. The questions of today, however, are those of efficiency and economy in operation and more intensive use of present facilities, and it is such questions that electrification is expected to solve where conditions warrant its application.

The study of railroad electrification presents two problems: First, we must demonstrate that electrification is adequate from an engineering and operating standpoint, and, secondly, we must justify financially the large investment required.

Electrification has proved to be the most reliable and economical means of transmitting power in railroad work. The electric locomotive has been successfully applied in all phases of railroad service, and has been utilized largely to overcome restrictions in operation caused by increase in traffic, which were unsurmountable with the steam locomotive.

Four Applications of Electrification

Its first application was to permit more freedom of movement in tunnels by eliminating the smoke of the steam locomotive. The trackage capacity of the Hoosac tunnel was increased fourfold by electrification, and the Simplon tunnel could hardly have been operated at all with steam.

The second application of electric motive power was to multiple-unit electric cars as a substitute for the steam suburban train. Elimination of shifting movements of engines and more rapid acceleration of trains has greatly relieved the trackage congestion of large terminals.

Mountain grades were the third application where electric operation surpassed in economy, capacity and reliability the best performance of the modern steam locomotive. Grade sections, when electrified, are no longer the limiting factor to the maximum tonnage which can be put over a railroad system. The Norfolk & Western Railway, whose Elkhorn grade is the heaviest tonnage mountain electrification in the world, now handles heavier tonnage trains at twice the speed of steam operation.

The fourth and final demonstration of the fitness of the electric locomotive was in the complete electric operation of several divisions of a transcontinental line. The Chicago, Milwaukee & St. Paul Railway is now operating all trains electrically over four of our principal mountain ranges. The electric passenger engines on this road make a daily run of 440 miles, with monthly averages of 12,000 miles, and individual engines have made runs of 766 miles in a twenty-four-hour period.

Problem Is Financial Justification

While electric operation has been successfully applied in the United States to fourteen different trunk lines, on 2,500 miles of track, and involving 354 electric locomotives, this represents only 1 per cent of the total steam tonnage and mileage in our country. The question which naturally arises is, why has not electrification been more seriously considered and adopted by our railroads? This brings us to the second problem, namely, that of financial justification.

Electrification is a betterment which requires a large amount of new capital investment, and to be attractive it must pay for itself by economies effected; its application, therefore, presupposes a condition of congested traffic.

Railroad electrification is advancing rapidly in such foreign countries as France, Japan, South America and others, under definite programs of expansion. In these countries the fuel situation is such that economies of operation obtained by utilizing hydroelectric power with electric locomotives, as compared to high-priced coal with steam locomotives, are sufficient to justify such investments of capital. No such condition exists in our country. Fuel costs on American railroads represent only 11 or 12 per cent of the total operating expense, while the fuel costs of the Swedish state railways were reported, during the war, to have been 50 per cent of the total operating expense.

A recent study of electrification on a mountain grade section of one of our heavy-tonnage railroads showed that, with coal costing $3 per ton and electric power at three-fourths of a cent per kilowatt-hour the power cost with steam operation is approximately the same as with electric operation, when maintenance charges for the substation and distribution systems necessary to get this power to the electric locomotive are included. With coal at $15 to $40 per ton in these foreign countries, and the price of hydro-electric power about the same as our own, the reason for their activity is at once apparent.

There are, however, other ways in which electrification can be justified on certain sections of some of our heaviest traffic systems. Our present business expansion is already demanding increased railroad capacity, future increase in which will be secured largely by using more efficiently the trackage which now exists. Electric operation will remove some of the inherent limitations of steam operation and thereby permit economic expansion in railroad work, just as it has in other industries.

One of the limitations of steam operation is labor. The higher wages and labor shortage now existing and which will continue to exist are an increasing handicap. The performance of electric equipment during periods of reduced maintenance and inspection has been well established. The effect of labor troubles on steam operation will only be magnified as this class of operation becomes more congested.

A second limitation is the extensive facilities required for steam locomotives, especially at terminals. The removal of coaling and watering stations, engine house facilities, inspection sheds and turntables and the speeding up of shifting movements and train makeup at terminals will all permit a more intensive use of present track facilities.

A third limitation results from the fact that the steam locomotive will always be an uncertain factor in the rapid movement of freight under adverse weather conditions. Its maximum capacity is fixed by the fact that it is a self-contained unit. This, in turn, is subject to its condition of overhaul and inspection, the quality of coal and the weather. The electric engine will always perform at its rating and, in addition, is good for short overloads, and has improved rating at lower temperatures. Cutting of tonnage rating and slowing up of trains at the very time when the maximum power is needed is a severe handicap to efficient operation.

If we expect the railroads to keep pace with our constantly increasing productivity, means must be provided for improvements and betterments in facilities and equipment. New capital

*Abstract of paper presented before the Rochester, N. Y., Chamber of Commerce, April 27, 1923.

cannot be obtained unless the railroads are allowed to earn sufficient to pay a reasonable return on the investment. Electrification is one of the major betterments which can be effected with sufficient resulting economies to carry all charges on the capital investment. Every existing electrification has successfully demonstrated this fact.

C.E.R.A. Committees Announced

THE committee appointments of the Central Electric Railway Association for the year 1923 are announced with the publication of the Association's "Brown Book." The committees are as follows:

Auditing: Tudor W. Jones, auditor Union Traction Company of Indiana, Anderson, Ind., chairman; J. S. Clark and F. E. Belleville.

Constitution and By-Laws: Charles L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis, chairman; F. R. Coates, C. N. Wilcoxon, F. D. Carpenter and A. C. Blinn.

Finance: Harry Reid, president Interstate Public Service Company, Indianapolis, chairman; S. W. Greenland and Robert I. Todd.

Hotel and Arrangements: S. D. Hutchins, Westinghouse Traction Brake Company, Columbus, Ohio, chairman; Harry L. Brown, John Benham, James H. Drew, J. A. Donahey, C. Dorticos and L. P. Morris.

Safety: Charles B. Scott, manager Bureau of Safety, Chicago, chairman; Neal Funk, J. H. Alexander, L. C. Bewsey, G. S. Wills, J. B. Stewart, E. M. Walker and James Harmon.

Program: Harry Reid, president Interstate Public Service Company, Indianapolis, chairman; M. Ackerman, J. C. Schade, I. W. Hansen and W. S. Rodger.

Publicity: J. S. Bleecker, general manager Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, chairman; Harry L. Brown, H. J. Kenfield, E. B. Atchley, J. A. Greenland, E. F. Wickwire and H. A. Nicholl.

Resolutions: Joseph A. McGowan, secretary Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, chairman; R. A. Crume, J. F. Starkey, Walter Shroyer and Gus Mulhausen.

Rules Governing Interchange of Equipment: C. S. Keever, general superintendent Union Traction Company of Indiana, Anderson, Ind., chairman; E. B. Gunn, P. L. Radcliffe, G. K. Jeffries and C. C. Fast.

Transportation: L. M. Brown, general superintendent Interstate Public Service Company, Indianapolis, chairman; G. K. Jeffries, J. A. Greenland, C. S. Keever, F. W. Brown, R. N. Graham and J. Frank Johnson.

Supply Men: Myles B. Lambert, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., chairman; C. C. Creighton, J. A. Donahey, E. C. Folsom, W. D. Hamer, C. T. Dehore, H. H. Buckman, S. W. Crawford, E. J. Smith, E. S. Sawtelle, G. L. Kippenberger, James C. Jameson and Robert J. Deneen.

Uniform Charges for Repairs to Interchanged Equipment: E. M. Walker, general manager Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., chairman; A. W. Redderson, P. V. C. See, R. C. Taylor, J. F. Elward and G. H. Kelsay.

Membership: A. C. Blinn, vice-president and general manager Northern Ohio Traction & Light Company, Akron, Ohio, chairman; William Harton, E. M. Walker, J. Frank Johnson, Myles B. Lambert.

Annual Transportation: G. K. Jeffries, general superintendent Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, chairman; Harry Reid, J. S. Bleecker, H. A. Nicholl, S. W. Greenland.

Standardization of Traffic Signal Colors

FORTY-TWO men, representing the manufacturers and the users of traffic signals, federal and state governmental departments, associations interested in the prevention of traffic accidents and representatives of the general public, are drafting a national code on the proper colors for traffic signals, which it is expected will not only cut down the annual loss of life through traffic accidents, but will eliminate many of the existing irritations to motorists and the operators of steam and electric railways.

This work is being carried on under the auspices of the American Engineering Standards Committee. The sectional committee drafting this code is made up of representatives of the manufacturers of traffic signals, purchasers of such equipment, the users of traffic signals, governmental bodies, technical specialists and insurance representatives.

Charles J. Bennett, State Highway Commissioner of Connecticut, who represents the American Association of State Highway Officials, is chairman of the sectional committee; M. G. Lloyd of the United States Bureau of Standards, representing both the bureau and the American Society of Safety Engineers, is vice-chairman, and Walter S. Paine, research engineer of the Aetna Life Insurance Company, who is the representative of the National Safety Council, is secretary.

Canvass on Wheel-Tread Width

THE Central Electric Railway Association has just recently been conducting a canvass regarding the opinions of members on the narrowing of interurban wheel treads to 3 in. Of the twenty-two companies that have replied to date, fifteen do not favor the change; two are willing to change a part of the present equipment to continue through traffic arrangements, the city of Detroit having specified the 3-in. tread for cars operating over its tracks; one is willing to change all equipment to take care of traffic arrangements, and four are now using the narrow tread. Considerable difficulty has been experienced in this territory from the use of narrow wheel-tread equipment due to derailments, which occur particularly in the spring.

American Association News

Committee on Rail Head and Wheel Contours Holds Busy Meeting

A MEETING of the Engineering Association special committee on wheel tread and flange and railhead contours was held in New York on May 11. The following members and guests were present: H. H. Adams, chairman, Chicago; J. H. Hanna, vice-chairman, Washington, D. C.; C. A. Alden, Steelton, Pa.; V. Angerer, Easton, Pa.; George L. Fowler, New York, N. Y.; J. F. Miller, Pittsburgh, Pa.; H. F. Heyl, Easton, Pa.; W. F. Graves, Montreal, Canada, and E. M. T. Ryder, New York, N. Y.

Designs of wheel treads and flange contours were decided upon which will be recommended to supersede the contours now standard and included in the Engineering Manual under Section Et-4a. Recommendations for contours of chilled iron and steel wheels were also decided upon. Revision of wheel dimensions and the present wheel mounting gage will be made so as to revise Manual sections Et-7b and Et-18a. The committee considered it inadvisable to recommend a change in the head of the present plain girder rail at this time.

Service Bulletins Now Available

THE following special reports have been prepared for the use of member companies in good standing:

Wage Bulletin 127 Revised: A new edition of the wage bulletin, which combines in one compilation the original bulletin issued on Sept. 1, 1922, and all of the monthly supplements showing changes to May 1, 1923.

Use of Reduced Rate Tickets and Transfers: A tabulated statement showing for a large group of companies the cash fare, ticket rate, transfers issued, the proportion of revenue passengers using reduced rate tickets and proportion using transfers, whether revenue or free, during 1922 and 1921.

Allowances for Going Value in Valuation Cases: A summary of court and commission decisions in valuation cases in which the questions of allowances for going value was brought up. The decisions are grouped by states and thus serve to indicate the attitude of the various states toward this question.

Trend of Material Prices: A new edition of the association's compilation, bringing down to date the trend of prices of materials used by electric railways as furnished by manufacturers.

Motor-Bus Operations: Gives operating figures of the Washington Rapid Transit Company for the first three months of 1923, a six-month statement for the buses operated by the United Electric Railways, Providence, R. I., and the combined operating statement of the California bus lines as compiled by the California Railroad Commission.

The News of the Industry

Bid Made for Co-operation

New York Transit Commission Urges that Transit Construction Matters Be Taken Up Frankly

George McAneny, chairman of the New York Transit Commission, has made an offer to co-operate with the Board of Estimate of New York City in getting subway construction under way at once, reconciling wherever possible the differences between the Mayor and the commission, so that the imperative need to relieve congestion might be met. His proposal was contained in a letter sent to the Board of Estimate on May 16. He urged that differences of opinion as to the value of certain routes be taken up frankly in conference as early as possible, and offered to meet the board half way in adapting the plans of the Mayor and the commission so that they might be molded into a complete, harmonious system.

Mr. McAneny pointed out that the Board of Estimate in the last two years had refused to approve any measures presented by the commission and that the responsibility of the Transit Commission and the Board of Estimate was a joint responsibility "beyond the possibility of either body to alter at the present time." He referred to the plan of the commission for a five-year building program, to cost $225,000,000, submitted a year ago, and to Mayor Hylan's five-year building program, based on a different arrangement of lines, some of which, Mr. McAneny said, were "wholly feasible." The commission would be glad to take up the Mayor's proposals if they would be submitted to the commission, and would be prepared to accept any change in its own program that would not be antagonistic to certain basic principles of construction and operation.

Mr. McAneny said that the most important work before the commission and the board was the proposed construction of the crosstown subway in Brooklyn and Queens and the Washington Heights extension from Fifty-ninth Street and Broadway. The former plans of the commission for these two lines have been revised to conform substantially with those proposed by Mayor Hylan, he said. The other parts of the commission's program which could be made to agree with the Mayor's plan were the Corona-Flushing extension, the extension of the Fourth Avenue subway in Brooklyn, and the Nassau Street line in Manhattan. These five projects would cost from $100,000,000 to $125,000,000, said Mr. McAneny, which would exhaust the funds the city would have available for subways for a year, and he urged that immediate action be taken with a view to getting this work under way.

Board Revokes Bus Permit

Because they violated the terms of the conditions under which their permits were issued Fred B. Sheldon & Son and Cornelius Jewell were ordered to discontinue the operation of their buses between Dover and Wharton, N. J. The complainant was the Morris County Traction Company, Dover, N. J.

The decision of the Utilities Board in this case is outstanding in that it is said to be the first time under the 1921 act that a previous order approving bus grants has been canceled.

The traction company charged the bus operators with violating a stipulation that they would not take on or discharge passengers while operating in Main Street and Blackwell Street in Wharton and Dover and also that they did not conspicuously display a sign notifying the public that no passengers would be taken on or discharged within the two points mentioned.

At the hearing the electric railway produced several witnesses who testified to the offenses charged by the traction company. The board pointed out that the defendants in effect admitted the violations and attempted to excuse their conduct by saying that it was a matter of violating the conditions of the grant or violating a permit to operate issued by the municipalities.

Permission to operate three buses between Dover and Wharton was granted to the above-mentioned defendants on Feb. 8 last.

Settlement Has Been Reached in Birmingham

Conferences Growing Out of "Jim Crow" Agitation Result in Agreement Practically Eliminating Jitneys and Providing Among Other Things for Reduction in Fare—End of Receivership in Sight

EARLY reorganization of the Birmingham Railway, Light & Power Company is expected as a result of a general agreement between the city of Birmingham, Ala., and the company, according to a joint statement of Lee C. Bradley, receiver, and J. S. Pevear, president and co-receiver of the company.

Settlement of all issues between the city and the company has been effected and was ratified by the City Commission by a unanimous vote at its regular meeting on May 8. An ordinance and a series of contracts, which was made a part of the ordinance setting forth the terms of the settlement, were formally adopted by the commission.

The principal features of the agreement are as follows:

Jitneys are practically eliminated by regulation. They are prohibited from operating on any street on which there is a car line or on any street paralleling and within two blocks of a car line. A surety bond of $10,000 is required from all jitneys allowed to operate, suburban jitneys and buses operating to outside territory excepted. Licenses for operation of jitneys are raised to $100 a year, with increasing licenses above a specified passenger-carrying capacity. Permits are required from the City Commission for the operation of any jitney and a necessity for their operation must be shown before the permits may be issued. Refund of half of the year's license to jitneys is provided.

Cash fares are reduced from 8 to 7 cents. Ticket fares are reduced from 6⅔ cents to 6 cents and are to be on sale at conveniently located places in books of twenty tickets for $1.20. Fares fixed are maximum, the company binding itself not to ask an increase inside of three years, though the city is free to ask a decrease in fares should conditions warrant such action.

Jim Crow ordinance recently adopted by the city will be enforced, but in modified form. Cars with separate entrances for white and negro passengers are to be provided upon all lines except the Highland Avenue and Lakeview line, the Loop lines, the Mount Terrace, Roebuck Springs and Rugby Highland lines, which will retain one-man cars. Movable partitions separating the portions of the cars occupied by white and negro passengers will be used on all lines. These partitions will extend from the aisle edge of the seat back to the top of the window.

Company will install 100 street lights at once and others as ordered. A reduction of from $54 to $48 a year in the price of maintenance of arc lights is made. The contract covers a ten-year period.

Conferences between the city and the company on questions of service are provided under the agreements.

Jitney regulations provided and car-fare reductions made are to go into effect on July 1. It is provided that should the enforcement of jitney provisions be held up by litigation or an election fare reductions and other provisions of the agreement shall be held up pending the result. The agreement is a general one and is made with the provision that if submitted to a vote of the people it shall stand or fall as a whole. However, the company is proceeding with plans to put the Jim Crow provisions into effect at once.

Orders are to be placed for twenty new cars as soon as bids can be obtained. According to present plans the new cars are to be of a large type with side entrances, the doors being toward the rear, leaving about two-thirds of

the car for white and one-third for negro passengers and providing effective separation of the races. Cars of a similar type are now in operation on the Tidewater lines. The cost of the new cars is estimated at something like $14,000 each or a total of $280,000 for the twenty.

The work of remodeling equipment now in operation is to start at once, Mr. Pevear stated. Ten large cars now equipped for pay-as-you-enter operation on the West End lines will be remodeled. Nineteen one-man double-truck cars will be remodeled for two-man operation with separate entrances. All of this work will be done in the local shops.

Action on the proposed settlement came after a lengthy series of conferences between City Commissioners and the co-receivers of the Birmingham Railway, Light & Power Company. The settlement followed the adoption of the Jim Crow ordinance by the city. This ordinance was to have become effective on April 15. Shortly before that date a conference between the commission and company representatives was held and it was suggested that the conference go into the question of a general settlement. The City Commission at an adjourned meeting on April 12 extended the time limit for the enforcement of the Jim Crow ordinance thirty days, or to May 15, pending the outcome of the conference. After several conferences the terms of the agreement were reached and the matter was turned over to W. J. Wynn, city attorney, and Mr. Bradley, receiver, to be put into proper form.

JITNEY OPERATORS PROTEST

Two meetings of jitney operators have been held, but their attorneys state that no definite course of action has been decided upon. However, funds have been subscribed by the jitney operators to make a fight in the courts.

Under the commission act, by which Birmingham is now governed, it is provided that such matters may be submitted to a vote on the presentation of a petition signed by 1,500 qualified voters. The election having been held, the law provides that the ordinance adopted by the voters at the election cannot be modified or amended by the City Commission and can be repealed or amended only by a majority vote of the people at an election. Members of the commission have expressed confidence that the settlement will be upheld if the issue is submitted to a vote, and it is generally believed that the jitney interests will hesitate to call an election.

The City Commission issued a statement following the adoption of the ordinance setting out the position of the commission and expressing the hope that the matter might be submitted to a vote. The commission declared that it is ready to enter into an election and fight to sustain its settlement.

Between 200 and 300 jitneys have been in operation in Birmingham for some time.

Representatives of the railway have assured the commission that the company will be in a position adequately to care for any added traffic when the ordinance takes effect.

D. C. to Replace Single Phase—Indianapolis Line to Be Extended 50 Miles to Cincinnati

The board of directors of the Indianapolis & Cincinnati Traction Company, of which Charles L. Henry is president, took definite action on May 15 to re-equip the present single-phase system for 600 volt d.c. operation. The plan calls for the purchase of new rolling stock, probably twelve new all-steel multiple-unit cars, and extensive rehabilitation of the present track and overhead. All of this is in preparation for an early extension from Rushville to Cincinnati, thus carrying out the original idea of the promoters to provide service between Indianapolis and Cincinnati.

The authorized expenditure for re-equipping the present lines is $767,271. It is planned to award contracts very shortly for this work. The present system comprises 101 miles of line and fifteen motor passenger cars, six motor freight cars and about thirty other cars. The extension to Cincinnati will require the construction of about 50 miles of new line running through a fertile farming territory not served by any railroad at present. The company plans to purchase its power. A three-phase transmission line will be built to connect with nine automatic substations.

The existing system is being placed in condition to tie up at once with the new construction.

Reports of Floods in Arkansas Exaggerated

Only a temporary suspension of the water, gas, telephone and electric railway service followed as a consequence of the flood, fire and cyclone which on May 14 wrecked the business district of the city of Hot Springs. Delay to the railway service was caused largely by the flooding of Central Avenue, which made the avenue, lying at the bottom of the valley, a rising river for a short time. On May 17 the street cars were again operating on all lines. The utilities sustained only minor damages. These were confined to the blowing down of wires, breaking off of a few fire hydrants and washing out of about 8,000 bricks in the pavement between car tracks. W. J. Boyer, secretary-treasurer of the Citizens Electric Company, operating the gas, electric and street railway service in Hot Springs, reported on May 17 that conditions there are again normal.

No Settlement in Pittsburgh,—The matter of a wage agreement and working conditions for the employees of the Pittsburgh Railways was still under discussion on May 15.

Philadelphia Report Under Attack

Common Council and Rapid Transit Company Do Not Agree with Its Findings

The special report presented by the Mayor's Transit Advisory Board in Philadelphia on the proposed high-speed lines in that city has been the subject of vigorous debates at conferences called by the Mayor to consider the topic. It has also been the topic of advertisements published in the daily papers by the Philadelphia Rapid Transit Company.

SYNOPSIS OF REPORT

The report was submitted under date of April 24 to Mayor Moore by the special commission consisting of Milo R. Maltbie, chairman; Morris L. Cooke and Francis Lee Stuart. This committee was appointed by the Mayor on Feb. 24 to consider the plans of the Broad Street subway, delivery loop, and other authorized high-speed lines, as heretofore prepared by the Department of City Transit. In its report the committee recommends as the first step a subway on Broad Street for pretty nearly its entire length or from Olney Avenue on the north to League Island Park on the south. About half of this would be four tracks and the rest two tracks, but the two-track sections would be so built that they could be changed to four tracks later. In addition the commission recommends a two-track branch subway leaving the Broad Street subway at Arch Street and going under Arch, Eighth and Locust Streets, back to Broad Street and then extending west on Locust and Walnut Streets to the Schuylkill River and then as an elevated line to Darby. In this respect the report recommends something like the Taylor plan, of a loop under these streets. Other recommendations contemplate the inclusion of the Chestnut Hill branches of the Pennsylvania Railroad and the Philadelphia & Reading Railway with the city-owned high speed line, a line over the Delaware River bridge now building and the adoption as standard for all these lines of a gage of 4 ft. 8½ in.

The significance of the last recommendation will be understood from the fact that the present Market Street and Frankford elevateds, operated by the Philadelphia Rapid Transit Company, have a gage of 5 ft. 2 in., the Philadelphia surface lines of 5 ft. 2¼ in., and the surface lines in Camden of 5 ft. The committee points out, however, that the steam railroad suburban lines, which it suggests should be taken over as feeders, have the standard gage and this cannot well be changed because they will still have to be used for the haulage of freight. It adds that if the Market Street and Frankford lines should have to be connected with the proposed subway later, they can be changed to standard gage without serious inconvenience.

In the introductory part of the report,

the committee says that the population of the city in 1920 was 1,823,779, and it is expected that by 1950 the population will be 2,743,000. The report points out that the traffic in Philadelphia has increased rapidly, as shown by the following table:

City	Period	Per Cent Increase Population	Traffic
Philadelphia	1910-1922	22	79
New York	1909-1919	19	44
Cleveland	1910-1919	38	71
St. Louis	1910-1919	11	14

The recommendations of the rapid transit committee are not in accord with the so-called "City-Company Plan" for better transit in the downtown district, recommended by the Philadelphia Rapid Transit Company and described on page 382 of the issue of this paper for March 3. The report of the Mayor's committee has also met a snag in the City Council, which on May 3 adopted a resolution providing for the appointment of a transit commission composed of the president of the City Council, a councilman from each of the eight districts, and a representative each from the Chamber of Commerce, Manufacturers' Club, Real Estate Board, Builders' Exchange, Operative Builders, and United Business Men's Association, with the Mayor as chairman.

The position of the Philadelphia Rapid Transit Company is stated by Chairman Mitten in a recent issue of "Service Talks" for May 8 where he argues that the case of the city and the company is like that of landlord and tenant. The company, the tenant, requires added space in the center of the city to meet increasing traffic needs, while the city, the landlord, finds the capacity of these streets required for the exclusive use of other traffic. The city and the company should solve this problem as any other landlord and tenant and make an arrangement for the transfer of street car tracks from the streets underground, and that the city and the company should co-operate in planning for future rapid transit lines.

To this the Mayor replied that the "tenant" had promised to do certain paving and charge only a 5-cent fare, but without the consent of the city had got rid of its paving and was charging a 7-cent fare, though it was paying 6 per cent dividends and erecting "super" funds for various purposes. Because it had control over all of the surface lines in Philadelphia and of the elevated and subway lines that have been built, the Mayor saw no reason why competition should be denied the sovereign (landlord) if any other operator should appear or if he should decide to provide the service himself.

Portland, Me., Men Seek Wage Advance

Trainmen employed by the Cumberland County Power & Light Company, Portland, Me., are seeking a wage increase amounting to 10 cents an hour. The men have been receiving 50 cents an hour. Operators of the one-man cars, who have been paid 55 cents an hour, are seeking an increase to 80 cents. The men now involved are the same men who a year ago submitted to a voluntary 10-cent wage reduction in order to decrease the deficit in the railway's earnings. A new agreement prepared by the men was submitted to the company several days ago and conferences have been held from time to time. The old agreement expired on May 1.

Town Wants Railway

South Jacksonville Ready to Spend $100,000 to Secure Service, but Wants Road Privately Managed

A municipally owned electric railway operated for the town by a private company appears to be in prospect for South Jacksonville, Fla., a town of approximately 3,500 population lying across the St. John's River from Jacksonville, with which it is connected by a highway bridge owned by Duval County, in which both Jacksonville and South Jacksonville are located.

The people of South Jacksonville have for some time been anxious to have the Jacksonville Traction Company extend its line across the toll bridge and into South Jacksonville. Just at the present time, however, there is not enough business in sight in South Jacksonville to warrant an expenditure on the part of E. J. Triay, receiver of the railway, of $100,000 to build and operate the line. The citizens of South Jacksonville realize, though, that in order for their town to grow and develop as it should it is necessary for them to have some means of transportation between their town and Jacksonville.

Bus Proposal Defeated

An election was held on April 10 to determine what should be done. The issue was put to the people in a general referendum to vote on three propositions:

1. Should South Jacksonville issue bonds in an amount of $100,000 to build and equip a street railway system connecting with the Jacksonville system?
2. Should South Jacksonville issue bonds in an amount of $30,000 to equip a motor bus line, running between South Jacksonville and Jacksonville?
3. A negative vote against either proposition.

Bus advocates were prominent and busy in trying to induce the people of South Jacksonville to install a motor bus line. Those in favor of a railway line were equally busy in trying to impress upon the people the advisability of the street car line, largely on the ground that it was more permanent in nature and that it would give better and more reliable service than a bus line. It was also pointed out that a railway would increase the value of real estate in that city and make it more desirable if a street car line were constructed than if a bus line were installed.

When the ballots were counted it was found that 147 people had voted for the street railway line, 113 for a bus line and 87 against either proposition.

The Council of South Jacksonville then took up with Stone & Webster, Inc., the matter of constructing the line for the city. An engineer representing Stone & Webster, Inc., is now on the ground and is making up estimates covering several routes. The Council of South Jacksonville will probably come to a decision as to the route to be selected at an early date. The present indications are also that Stone & Webster, Inc., will be awarded the contract for the construction of this line.

The town of South Jacksonville also has taken up with the receiver of the Jacksonville Traction Company the question of operation of the line in connection with the railway system in Jacksonville. An agreement will probably be reached, if and when approved by the court, under which Mr. Triay will take over the operation of the line for South Jacksonville and operate it in connection with the Jacksonville system.

Another Franchise Being Drawn for Saginaw

After a two-day session with Otto Schupp, grantee under the last street car-bus franchise that was defeated on April 2, the Council of Saginaw, Mich., has asked that a new franchise be written for Mr. Schupp to submit to the bondholders' protective committee of the bankrupt Saginaw-Bay City Railway at an early date.

The term of the grant is to be fifteen years, and the rate of fare, four tickets 25 cents; 10-cent cash fare; six tickets 25 cents or 5-cent cash fare for school children during school hours, and universal transfers.

The Council proposes that the rate of fare so fixed shall continue during the term of the franchise and that all disputes between the operating company and the City Council shall be settled by a board of arbitration composed of three, all Saginaw citizens. The Council is to name one member of this board, the company one and a federal judge the third.

This provision is designed to eliminate the need for appeal to the Michigan Public Utilities Commission to settle disputes, while with a fixed rate of fare to continue during the period of the franchise the necessity will be done away with of fixing a rate value. This has been considered a stumbling block to the people approving the franchises that were submitted in April and on Nov. 7 of last year.

There are some other changes in the grant proposed last month, but they are of minor importance.

The attorneys for the city and the grantee, when the conference had concluded on May 8, immediately set to work to rewrite the former franchise. It is expected this will be accomplished in a few days, when the new grant will no doubt be approved by the Council. Mr. Schupp will then be asked to submit it to those who will be asked to finance the project.

Men on Strike

Schenectady Employees Vote for Walk-Out—City Favors Strikers—Company Wants Open Shop

A strike of the operators of cars of the Schenectady Railway was started at midnight on May 16 when failure of the trolley company officials to meet the union representatives in arbitration with Mayor Whitmyer had resulted in an almost unanimous vote of the men to go out. The strike ties up not only the local city traffic but all urban service between Schenectady, Albany, Troy, Saratoga, Watervliet and Ballston Spa as well as service to the villages of Scotia and Woodlawn. About 600 men are out.

No cars are expected to be operated until a settlement is made unless the court should intervene, as just before the strike vote was taken John E. Cole, commissioner of public safety, told the men that in the event of a strike the cars would be kept in the carhouses. He ordered a guard of police stationed at each carhouse to see that the cars were not run out after they had been turned back on May 16. The balloting was a secret referendum but it was said the vote was almost unanimous.

CITY ADMINISTRATION WITH THE STRIKERS

President Frank X. Shay of the Common Council, following the strike vote, told the trolleymen he would aid them in every way by any possible legislation that could be passed by the Common Council. He was followed by Alderman Ray Madden, who said: "Go out and make a strong fight—a winning fight, and I wish you success." Commissioner Cole told the trolleymen to wage a clean fight "and not hit below the belt." He told them he believed they would win.

The strike issue was brought to a head by Harry B. Weatherwax, president of the company, who addressed the trolley men at a meeting of the employees on May 15, when he declared that the Schenectady Railway would operate on an open-shop plan from now on. This stand taken by Mr. Weatherwax after he had been requested by the Mayor to arbitrate brought about the crisis. The Mayor immediately made a last appeal to both sides to arbitrate, in which he was supported by the president of the Chamber of Commerce. Mr. Weatherwax was firm in his stand not to treat with the union officials, the only concession he would make being that he would put the matter up to the meeting of the board of directors who own the stock of the road, which meeting will take place early next week.

James Largay, international officer of the union, who is at present in charge of negotiations for the men, said that in his opinion the company was determined to break the union because of the existence of an old agreement, under which the company would be compelled to pay a 60 cent wage as long as it received a 7-cent fare on city lines. He referred to the agreement entered into several years ago by a former general manager of the company, with the Amalgamated Association, which was a triangular affair resulting from the demands of the men during the war for an increase which was granted through a waiver of the franchise rights by the Common Council. The Council did this so the company would be financially able to increase the wages from 45 to 60 cents. On Dec. 1 last the scale was reduced to 45 cents.

The strike promises to develop a most interesting situation. With the city of Schenectady assuming responsibility for transportation facilities and using its police powers to prevent the company from operating its cars unless it comes to an agreement with the trolleymen's union, and Mr. Weatherwax and Mr. Hamilton determined that they will not recede from the position they have taken, either the company will be forced into serious financial straits or the city of Schnectady will establish the feasibility of municipal regulation of transportation facilities, and with a municipal election to be held in November the administration is certain to bend every effort to do this one thing.

Interurban Increases Wages of Employees Other than Trainmen

Increases of from 3 to 5 cents an hour in the pay of all classes of labor employed by the Indiana, Columbus & Eastern Traction Company with the exception of transportation men were announced on May 11 by F. A. Healy, secretary-treasurer of the company. The increase is retroactive to May 1 and will be added to the pay made May 20. According to Mr. Healy, the increase will add $3,500 monthly to the payroll. Section men are increased from 30 to 35 cents an hour, bridge carpenters from 40 to 45 cents, bridge carpenters' helpers 35 to 40 cents. Other classes of employees get increases ranging from 3 to 5 cents an hour. The increase, Mr. Healy declared, is in line with the increases which have been made by the steam roads of the country.

Pennsylvania Information Committee Functioning

The Pennsylvania Public Service Information Committee started to function on May 15. P. H. Gadsden, vice-president of the United Gas Improvement Company and chairman of the committee, in announcing the purpose of the new organization, said:

> The purpose of the committee is primarily educational. In the last few years the rapid development of public interest in public utilities along practical lines has rendered this necessary. The committee is, in fact, a State bureau created to supply to the public, through the press and otherwise, accurate information concerning the public utilities of Pennsylvania, with a view of crystallizing sound public opinion and a feeling on the part of the public which will promote clear understanding of public utilities.

The executive committee is composed of P. H. Gadsden, chairman; W. C. Dunbar, Philadelphia Rapid Transit Company; W. H. Johnson, W. C. Hawley, C. L. S. Tingley and P. C. Stapler. Headquarters of the committee are 930 City Center Building, Board and Cherry Streets.

James M. Bennett, publicity manager United Gas Improvement Company, has been named secretary of the committee. Major J. S. Stewart Richardson has been appointed director.

Connecticut Men Present Demands

The Connecticut Company, New Haven, on May 14 received the demands of the trolleymen's union to be incorporated in a proposed new agreement when the present one expires on June 1. The request is for a maximum wage scale of 65 cents an hour, an increase of 13 cents. For operators of one-man cars the maximum is 80 cents an hour, an increase of 21 cents. The shopmen and mechanics ask for a 25 per cent increase.

News Notes

Platform Men Receive Increase.—The Buffalo & Lake Erie Traction Company, Buffalo, N. Y., operating between Buffalo and Erie, Pa., has granted a wage increase of 5 cents an hour to its platform employees. About 250 men are affected. The men had threatened to call a strike May 1, 1923, unless their demands for a wage increase had been granted. Operators of one-man cars will now receive 60 cents an hour and trainmen on cars requiring two men will receive a maximum of 55 cents an hour.

Interurban Men Get Increase.—Motormen and conductors employed by the Cleveland, Southwestern & Columbus Railway, Willoughby, Ohio, have voted to accept a wage increase of 5 cents an hour. The new scale provides an increase of 12 per cent over last year's wages. It is the equivalent in amount to that awarded the Cleveland Railway's platform men by a board of arbitration. The new wage scale for the interurban gives first-year men 46 cents an hour, second-year men 50 cents an hour and third-year ment 54 cents an hour.

Men Receive Wage Increase.—Three hundred employees including trainmen, of the York Railways will receive an increase in their wages amounting to 2½ cents an hour. Under the new schedule all who have been with the company six months will receive 42½ cents an hour plus a 10 per cent bonus, which equals 46.75 an hour. Those who have been with the company longer than six months, up to the second year, 43½ plus bonus, 47.85; second year, 44½ plus bonus, 48.95; third year, 45½ plus bonus, 50.05; fourth year, 47½ plus bonus, 52.25; fifth year, 48½ plus bonus, 53.35. The men work from nine and one-half to ten hours a day.

Financial and Corporate

Lake Shore Plans Announced

Ohio Interurban to Readjust Capital Structure and Arrange for Customer and Employee Ownership

Plans have just been announced for the reorganization of the finances of the Lake Shore Electric Railway, which operates 225 miles of interurban railway connecting Cleveland, Toledo, Detroit, Lorain and Sandusky. Under the refinancing arrangement $2,000,000 of 7 per cent prior preferred stock will be issued. The money derived from the sale of this stock will be used to retire maturing obligations, improve equipment and generally rejuvenate the road.

Involved in the refinancing plan, too, will be the retirement of $500,000 of authorized but unissued first preferred treasury stock. A million dollars of this first preferred stock is now out.

Articles of incorporation are to be amended and changed so that ultimately the authorized capital stock of the company will consist of $9,500,000 of stock of $100 par value. Of this capital, 20,000 shares are to be prior preference stock, 10,000 shares first preferred, 20,000 second preferred and 45,000 shares common stock.

At the present time the company has $1,000,000 of first preferred stock outstanding, $2,000,000 of second preferred, $4,500,000 of common stock and bonds totaling $5,750,000.

An effort is to be made by the company to secure wide distribution of the company's new stock in home markets, following the lead of other public utility companies in the scheme of customer ownership.

In a letter to the stockholders E. W. Moore, president of the company, says:

> Your officers and directors for some time have been convinced of the desirability of a change in the financial structure of the company so as to decrease the amount of its floating indebtedness and fixed charges. In studying the situation they have been impressed with the success of various public utilities in this and other States in arranging permanent financing through the sale of preferred stock to and through employees, to patrons and the public in territory served.

President Moore also refers briefly to the plan already outlined. He continues as follows:

> The experience of other public utilities in arranging this kind of permanent financing indicates, and your officers believe, that your company would receive the following benefits from the issue and sale of this stock:
>
> 1. From the wide distribution of this stock through the territory served the company would have a larger number of stockholders directly interested in its welfare.
>
> 2. The problem of refunding the company's bonds would be simplified by reason of the smaller amount of bonded indebtedness which, in turn, should enable the company to refund its bonds at a lower rate of interest, thus benefiting all stockholders of the company.
>
> 3. This plan would provide funds for capital expenditures heretofore provided for through the creation of floating debt and the use of the entire surplus earnings which in the past has prevented, in part at least, the distribution of any part of the earnings to stockholders.

The new plan was ratified by the stockholders at a meeting held at Cleveland on May 14.

Amicable Settlement Averts Receivership

Agreements have been reached to stipulate on certain points in the suit of the Emergency Fleet Corporation, to dispose of the debt standing against the city of Tacoma, Wash., in the case of the municipal car lines to the tideflats. Under the understanding, receivership of the municipal car line will be avoided and the special fleet debt fund will not be sought by the government, pending settlement. Under an agreement between the government representatives and the councilmen for the city the fleet corporation counsel will be allowed to make a physical inspection of the municipal line and equipment and go over the accounts of the city pertaining to the operation of the line. Counsel for the government recently secured a restraining order in the federal court preventing the city from disposing of any of its railway funds by transfer or otherwise, or in any way changing the conditions pending settlement.

Railway and Power Departments Segregated in Portsmouth

The Virginia Railway & Power Company has transferred its Portsmouth holdings to the Portsmouth Transit Company, Portsmouth, Va., which was organized and chartered recently, and which has just made a bid for the traction franchise of that city. Announcement to this effect was made by A. H. Herrmann, assistant to Thomas S. Wheelwright, president of both the new and the old company. The new company will be a subsidiary of the Virginia Railway & Power Company.

W. Jennings Crocker, Jr., counsel for the Virginia property in Portsmouth, is secretary of the new company. Among other incorporators is T. Norman Jones, general manager of the property in Norfolk.

Mr. Herrmann said the movement is one to segregate the railway property of the company from its light and power business. The new company will have nothing to do with the light and power departments of the Virginia Railway & Power Company in Portsmouth, but will buy its current from the concern. The new company is the only bidder on the new franchise offered for operation in Portsmouth by the City Council. Its bid was $5. Mr. Herrmann said the Virginia Railway & Power Company probably would take over the franchise in the course of time.

The new company will sell $750,000 of stock to the citizens of the community.

Seattle Municipal Gross Slightly Less

Operating Expenses Are Reduced by Greater Use of One-Man Cars—Revenue Accounts Shown

The Seattle Municipal Street Railway Department's annual report for 1922 was transmitted to the Mayor and City Council on March 28, by D. W. Henderson, general superintendent of railways. The figures are given in a form somewhat different from the usual corporation annual report. Total gross revenues for the year were $6,228,103, as compared with $6,347,175 in 1921; and total operating expenses, including depreciation and amortization, were $4,631,508. The 1922 report does not give the comparison of these expenses with 1921, but in the 1921 report they are shown as $5,105,487. The accompanying table, "Statistical Report of Operation," shows the detail of revenue and expense accounts. In the operating revenues are included a debit item of discounts and adjustments totaling $55,253, and in the miscellaneous revenues are included operating expenses of shops, service equipment, and utility equipment, totaling $41,984.

The resultant net revenue, $1,596,594, is not shown in the statement. The fixed charges along with operating expenses and separate income are shown in an "income, profit and loss statement." The deductions from gross income, shown in that statement, are:

Interest on general bonds outstanding		$35,750
Interest on revenue bonds outstanding:		
Total accrued	$800,217	
Less interest charged to construction	11,750	788,467
Miscellaneous interest		4,408
Amortization of discount on funded debt		6,908
Total deductions		$835,533

This leaves the net operating income for the year $761,062.

The net income was augmented as shown in the accompanying table of "Profit and Loss."

PROFIT AND LOSS		
Net income		$761,062
Gains accrued (other than income), current annual period		5,843
Delayed gains accrued in prior periods		22,140
Unearned increase of surplus—auto bus donated		3,227
		$792,272
Losses accrued (other than income), current annual period	$283	
Delayed losses accured in prior periods	81,905	82,188
Net income, profit and loss (gain), 1922		$710,084

The condition of the property is shown in the balance sheet. Capital assets, including plant and equipment, special construction, and cash on hand available for capital outlay, totaled $15,072,693. Against this, funded ob-

ligations and accounts payable are outstanding to the amount of $16,716,384. The total assets fail to equal the total liabilities, there being a deficit up to the end of 1922 amounting to $877,491.

The system spent $1,048,687 for plant additions and betterments during the year, of which $427,832 was for the rebuilding of cars and motive equipment, and $471,861 for undistributed construction of plant and work in progress. Against this the plant retired from service was $518,413, leaving the net additions during the year $530,274.

STATISTICAL REPORT OF OPERATION, SEATTLE MUNICIPAL STREET RAILWAY.

Revenues	Amount	Cents per Car-Mile	Cents per Car-Hour
Passenger car revenue	$6,130,729	39.64	366.19
Other operating revenue	85,840	0.56	5.13
Total operating revenue	$6,216,569	40.20	371.32
Miscellaneous revenues and expenses	11,533	.07	.68
Total gross revenues	$6,228,102	40.27	372.00
Operating Expenses			
Way and structures	$382,805	2.48	22.86
Conducting transportation	2,040,453	13.19	121.88
Maintenance of transportation equipment	382,607	2.47	22.85
Housing and hostling equipment	186,956	1.21	11.17
Power	613,677	3.97	36.65
Commercial	49,725	.32	2.97
General	290,171	1.88	17.33
Depreciation and amortization	685,114	4.43	40.93
Total operating expenses	$4,631,508	29.95	276.64

CONDENSED BALANCE SHEET OF SEATTLE MUNICIPAL RAILWAY AS OF DEC. 31, 1922

ASSETS		
Capital assets:		
Lands	$423,894	
Plant and equipment, $16,067,323, less accrued depreciation, $2,443,094	13,624,229	
Cost of "Greenwood" line acquired in 1922	55,410	
		$14,103,533
Special construction		593,263
Cost available for capital outlay only (bond funds cash)		375,897
Total capital assets		$15,072,693
Total redemption and special fund assets		1,101,218
Total current assets		649,343
Deferred charges		85,522
Deficit, Dec. 31, 1922		877,491
		$17,786,267
LIABILITIES		
Capital liabilities:		
Bonds outstanding	$16,652,000	
Bond fund loan payable to railway operating fund	542	
Accounts payable	63,842	
Total capital liabilities		$16,716,384
Redemption and special fund liabilities:		
Accrued interest on funded debt	$274,774	
Matured unpaid bonds, principal	250	
Depreciation fund reserves	33,294	
Total redemption and special fund liabilities		$308,318
Current liabilities:		
Amounts payable to general, light, and railway bond redemption funds	$445,884	
Accounts payable, tokens and approved claims	282,604	
Warrants outstanding	33,075	
Total current liabilities		761,565
		$17,786,267

CLASSIFICATION OF PASSENGER CAR-HOURS AND CAR-MILES IN SEATTLE FOR 1922

	Car-Hours	Car-Miles
One-man single truck	168,307	1,291,260
One-man double truck	296,856	2,704,945
Two-man	1,161,343	11,107,158
Buses	28,463	258,822
	1,654,969	15,362,185

The authorized bonds of the company totaled $16,730,000, of which there were outstanding $15,877,250. Interest accrued on these bonds during the year amounted to $800,217.

The system carried a total of 96,406,775 passengers, of whom 598,828 rode on the three bus lines operated by the railway. The car-miles and car-hours operated to handle this business are shown in an accompanying table.

"In connection with the data furnished," says the report, "the following comments will be of some value:"

The number of trainmen has been reduced due to the increased number of one man cars in use. Schedule hours have been increased. Schedule speed has been reduced, fully explained by the fact that First Avenue traffic was for the greater part of the year diverted over other streets, making undue congestion.

Our maintenance department has made numerous and extensive repairs. The general condition of roadway and tracks has been much improved.

Aside from general repairs, during the year the shops have converted forty-five two-man cars into one-man cars.

In general, with the nearing of completion of paving on First Avenue from Pine to Atlantic Streets; the better condition of tracks and equipment; the success of the one-man car of the larger type, and the fact that we are prepared to extend their use, we face the coming year in a better condition economically to serve the public than in any year under municipal ownership.

During the year the company has had 3,989 railway accidents, which was an increase of seventeen over the previous year. There were also 1,626 non-railway accidents, a decrease of 107 from the previous year. The principal cause of accidents was collisions with vehicles, which totaled 2,634. The amount of injuries and damages during 1922 was $37,368, corresponding to 0.24 cents per car-mile, or 0.6 per cent of the gross revenues.

The company has a total of 1,880 employees, of whom 1,216 are trainmen. There are thirty-nine other employees in transportation work, forty-two in accounting—including storekeepers and cashiers—and 583 in maintenance of way, construction, and equipment.

An uncommon feature in the labor situation is that all the employees are given vacations with pay. The extent of this is shown in the following table:

PAYROLLS AND VACATIONS—1922

	Payroll	Cost of Vacations
Train roll	$2,127,457	$95,134
Shop and carhouses	485,366	16,043
Way and structures	324,172	24,347
Accounting department	80,605	3,295
	$3,017,600	$138,819

Additional Common Stock to Be Offered

The United Light & Railways Company, Grand Rapids, Mich., has announced that all first preferred and participating preferred stockholders of the company, of record at the close of business May 25 will be permitted to subscribe at par, to an amount of common stock equal to 5 per cent of their holdings. All common stockholders of record May 25, will be permitted to subscribe, at par, to an amount of common stock equal to 10 per cent of their holdings. This will bring the total of the common stock up to $4,500,000.

Treasury Rules on Profits of Subsidiaries

The Treasury Department in a decision made public on May 11 by Commissioner Blair of the Internal Revenue Bureau has declared certain kinds of corporation dividends exempt from taxation as income. The refunds will come from claims filed under amendment to the tax regulations covering distributions out of earnings or profits by holding corporations accumulated prior to March 1, 1913.

The ruling reverses the previous practice of the bureau, which has held that profits or earnings turned in by a corporation to its holding or parent corporation lost their identity, and therefore when distributed as dividends were taxable as income.

Now, however, the bureau will trace the funds created by the subsidiary company through the holding corporation finally to the stockholder, who, the decision holds, need not pay tax on it. Limitation is made, however, on the distribution of such earnings by the ruling, which adds to the previous regulation the following language:

Whenever one corporation has received from another corporation distributions out of earnings or profits accumulated by such other corporations prior to March 1, 1913, or out of increase in value of its property accrued prior to March 1, 1913, and the receiving corporation, after having first distributed all of its earnings and profits accumulated since Feb. 28, 1913, distributes to its stockholders the amount so received by it from such other corporation, such distributions are not dividends within the meaning of the Revenue Act and are exempt from tax.

Brooklyn Subsidiaries to Be Reorganized

The reorganization committee of the Brooklyn Rapid Transit Company, headed by Albert H. Wiggin, has promulgated a plan for the reorganization of the New York Consolidated Railroad and New York Municipal Railway Corporation, and for adjustment of the respective interests therein of bondholders, creditors and stockholders of these companies. The plan contains an offer to acquire all or part of the preferred and common stocks of the New York Consolidated Railroad outstanding and to issue in exchange preferred and common stock of the reorganized Brooklyn Rapid Transit Company.

The New York Consolidated stockholders participating in the reorganization will receive for each share of preferred stock deposited one-half share of new 6 per cent preferred stock and one-half share of new common, and for each share of common deposited two-fifths share of the new 6 per cent preferred and three-fifths share of new common.

By exercising an alternative option for participating in the reorganization, holders of preferred and common stock of the New York Consolidated will be entitled to exchange holdings for a proportionate amount of stock of the new rapid transit subsidiary proposed to be organized as provided in the Brooklyn Rapid Transit reorganization plan, upon payment of $100 for each share of pre-

ferred and $105 for each share of common. In return for payments, stockholders will be entitled to receive an equal principal amount of rapid transit refunding mortgage 5 per cent bonds of the new rapid transit subsidiary proposed to be formed.

Stockholders electing the second option will receive for each share of preferred stock $100 rapid transit refunding mortgage 5 per cent bonds and one share of capital stock of the new rapid transit subsidiary; for each share of common stock $105 rapid transit refunding mortgage 5 per cent bonds and one share of capital stock of the new rapid transit subsidiary.

The new rapid transit company contemplated under the Brooklyn Rapid Transit reorganization plan will be vested with the rights and obligations existing under contract No. 4, including leasehold interest in city-owned lines, as well as with title to company-owned elevated lines and other properties now embraced in the rapid transit system. The new rapid transit refunding mortgage 5 per cent bonds will be an obligation of this subsidiary.

The properties of the Consolidated company and of the Municipal Railway have been in the hands of Lindley M. Garrison as receiver since Dec. 31, 1918. He has sold $18,000,000 of receiver's certificates, the proceeds of which have been expended for construction purposes under rapid transit contract No. 4. Suit has been brought to foreclose the first mortgage of the Municipal company and the mortgage securing obligations of the Consolidated company.

The New York Consolidated Railroad owns the elevated lines in Brooklyn, which are operated in conjunction with certain rapid transit elevated and subway lines built with money advanced by the city of New York. It also owns all of the $200,000 of issued and outstanding capital stock of the New York Municipal Railway, which by contract No. 4, dated March 19, 1913, with the city agreed to contribute certain funds toward the construction of certain subway and elevated lines to be built and owned by the city, to equip those lines, to reconstruct and extend the then existing "L" lines owned by the Consolidated company and to operate as a single system all of the "L" lines and the new subway and "L" lines to be constructed. The contracts of the Municipal company with the city were subsequently assumed by the New York Consolidated Railroad.

P.R.T. Valuation Hearing Ends

The taking of testimony in the property valuation proceedings of the Philadelphia Rapid Transit Company, which has been before the Public Service Commission for nearly three years, was concluded before Commissioner Clement on May 15. The commissioner announced that he had arranged to hear the arguments before the entire commission on June 7. In the meantime the city and the P.R.T. Company will file briefs with the commission.

Detroit Mayor Claims Profit in First Year's Operation

With the completion of one year of unified operation by the Department of Street Railways on May 14, Mayor Doremus of Detroit issued a statement to the effect that the Detroit Municipal Railway is paying its way from earnings and improving service as well. The Mayor pointed out the following results for the first year of unified operation: Gross income, $19,000,000; net income, $1,000,000; total number of passengers carried, 475,000,000; average daily number of passengers, 1,500,000; trackage, 373 miles; number of cars, 1,600; cars maintained in daily schedule, 1,425; amount set aside from income to pay interest in sinking fund charges, $4,000,000; taxes paid, approximately $500,000; number of D.S.R. employees, 6,000.

During the past year there has been paid from earnings the sum of $1,200,000 on the contract under which the lines were taken over from the private company. Of this amount, $500,000 represents a payment that is not due until June 1, and $200,000 an advance payment on the installment due December 1.

During the past year a comprehensive program was adopted to rehabilitate the tracks and equipment taken over from the former owner, and this program has been financed from earnings of the system. Owing to the condition of the tracks at the time of purchase, it will require several years to complete this program.

The foregoing results have been accomplished after paying from earnings $456,796.83 for taxes and setting aside 3 per cent of the gross revenue from operations with which to pay damage claims and judgments resulting from personal injuries, according to the Mayor.

The last available statement of earnings under date of March 31 shows that the Department of Street Railways, since May 15, 1922, after meeting the total operating expenses, taxes and all fixed charges, had made a net profit of $948,023, a monthly average of $90,000. So it may be assumed, the Mayor states, that in the year closing May 14 the department's net profits will have exceeded $1,000,000.

These earnings have been transferred to the surplus account. In order to correct an impression that may exist that this surplus represents actual cash, it was pointed out that while the amount is carried as surplus, it represents, to a large extent, expenditures from earnings for additions and betterments of an extraordinary nature. Instead of leaving the money in the treasury it has been expended in rehabilitating the system.

Some of the major items into which the surplus has been converted are: The building of trailers, the construction of a large paint shop, the purchase of additional automobile trucks, the building of additional track layouts, the purchase of machinery, tools and equipment, the payment of a five-year insurance policy and the prepayment of taxes.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Sale of Branch Line Approved. — Federal Judge Killits of Toledo, on April 27, approved the sale of the Lima-Defiance branch of the Indiana, Columbus & Eastern Traction Company to Joseph A. Murray for $25,000.

Commission Approves Boston "L" Issue.—The Department of Public Utilities of Massachusetts has approved the issue by the Boston Elevated Railway of not more than $2,300,000 of thirty-year 6 per cent negotiable registered or coupon bonds.

New Director for New York — Harlem Railroad.—Bertram Cutler has been elected a director of the New York & Harlem Railroad, New York, N. Y., to fill the vacancy caused by the death of William Rockefeller. The other directors have been re-elected.

Offer to Purchase Line.—Following a proposal by the Brunswick Traction Company, Brunswick, Ga., to sell its property to the city for $22,283, the city commissioners have submitted their price of $12,000. Authority will be asked of the Legislature shortly for the city to own and operate the railway.

Seeks Issue to Rebuild.—The Lima Street Railway has petitioned the Ohio Utilities Commission for permission to issue $100,000 in common stock to rebuild the lines. If the issue is approved the outstanding stock of the company will be $965,000. D. J. Cable, attorney; Congressman John L. Cable and others bought the property of Thomas Newhall, Philadelphia, for $730,000 and stock totaling $135,000 was issued for the purchase of twenty one-man cars.

Shawinigan Said to Be After Quebec Lines.—Interests identified with the Shawinigan Water & Power Company are said to be considering acquisition of control of the company. If the plans mature, says the *Financial Post*, Toronto, Shawinigan will provide the funds to meet the $2,500,000 of bonds that mature on June 1. This may be done by the purchase of an equivalent amount of the 5 per cent consolidated bonds by the new interests and the creation of an additional loan to the company to cover the difference between market value and par. Or it may be done by short-term financing looking to permanent funding of the bonds later when Shawinigan finally sits in the saddle and can show a record of successful operation. The *Post* says that if the Shawinigan deal falls through it is quite likely the directors will fall back on the former plan of financing the refunding operations by short term notes. The latest move in connection with this matter is the announcement of the election of Julian C. Smith to succeed President Robert with the Quebec Company.

Traffic and Transportation

Council Firm for Ten Cents

Seattle Body Wants Former Cash Fare Restored—Members Prepared to Pass Measure Over Veto

At a recent joint meeting of the city utilities committee and the entire City Council of Seattle, Wash., enough votes were indicated to insure passage of the proposed ordinance to increase fares on the Seattle Municipal Railway over Mayor E. J. Brown's veto. As amended, the present ordinance provides for restoration of fare to a straight 10-cent cash rate with three tickets for 25 cents. This was the rate in effect before the 5-cent fare was introduced on March 1.

Six votes are required to pass the measure over Mayor Brown's veto, and these votes have been pledged. The rates named in the ordinance were suggested to the City Council by Superintendent of Utilities Russell several weeks ago. Recently Mr. Russell sent the Council a report showing that even if the issue of railway purchase bonds was extended to forty years, at rates of interest varying from 4 to 5 per cent, discussed in connection with pending negotiations, the fare would have to be raised to more than 7 cents in order to take care of all charges.

Mayor E. J. Brown has appointed a committee to negotiate with A. W. Leonard, representing the Stone & Webster interests. The committee includes Mayor Brown, President C. B. Fitzgerald of the City Council and E. L. Blaine, chairman of the finance committee. The city intends to propose to the trustee suggestions for the extension of the maturity of the bonds given by the city in payment for the road. The idea is to extend the contract to forty years from the original date of issue, with equal annual payments. Mayor Brown does not favor Mr. Leonard's suggestion that the committee be sent to Boston, but believes negotiations should be carried on in Seattle. The bonds are now written for twenty years, of which four have elapsed. The forty-year proposal would enable the city to cut down its annual payments on principal and interest to a total of approximately $650,000.

Fight On in Buffalo Over Fare Increase

Dr. Milo R. Maltbie has been engaged by the municipal authorities of Buffalo to assist the city in its fight against the attempt of the International Railway to raise its fares from 7 cents or four tokens for 25 cents to 8 cents or four tokens for 30 cents.

Frederick C. Rupp, deputy corporation counsel, has been detailed by the city to handle the legal phase of the fight. He says there is no justification for the attempt of the railway to increase the fare at this time. He regards the move of the company as an attempt to recoup itself for losses in the strike.

Herbert G. Tulley, president of the International, explains that the application is made because the receipts are insufficient to pay the actual cost of operating the local lines. For the three months ended March 31, 1923, the deficit for the system, he says, was $193,219. Over and above operating expenses the company must pay bond interest, which amounts to $387,222. The total deficit, therefore, of the company for the first three months of the current year is $580,441. The amount of this deficit attributable to operations within the city of Buffalo, Mr. Tulley says, is $319,855.

City Agrees to Fare Extension

The Kansas City Railways filed an application with the Public Service Commission of Missouri on May 5 for authority to continue charging the public the same schedule of fares it now is exacting and extending the time for one year from May 18, 1923.

John B. Pew, Kansas City city counselor, wrote to the receivers, as follows:

I do not feel that I could sincerely resist an application on the part of the receivers for a continuation of these fares at this time. I do desire to suggest, however, that if your body, after examining the evidence, feels that these fares should remain as at present, an order be made continuing them indefinitely, or if for a fixed time, that it be not longer than six months.

Mr. Pew says he believes the road is being operated as economically as possible.

A section of the application shows that for all of last year a deficit above the earnings occurred to the extent of $418,504, and that for January, February and March this year, the deficit was $86,165.

The fare in Kansas City is 8 cents.

Houston Jitneys to Be Rerouted

City Council Decides Autos Must Be Removed from Streets that Have Car Lines—Jitney Men to Submit Plans to Meet New Requirements—Hope Ahead for Railway

After considering both sides of the question the City Council of Houston, Tex., on May 4, voted to reroute the jitneys to streets not occupied by the railway lines. Both the Houston Electric Company and the jitney men were requested to submit a rerouting plan, and from these plans the Public Service Commissioner will definitely establish the new routes. This will eliminate direct competition between street cars and jitneys and is expected to help solve the transportation problem in Houston.

The jitney matter came up again for consideration as a result of the appeal of the Houston Electric Company for relief. It will be recalled that the company recently negotiated an extension of its franchise calling upon it to spend $1,200,000 for rehabilitation and improvements. The jitneys had long been more or less of a menace to the company, but with the beginning of this program their operation became a source of greater annoyance than ever to the company. After construction work was well under way, the Houston Electric Company asked the City Council to reduce the number of jitneys. At that time 191 jitneys were running. By way of a compromise the city agreed to reduce the number to 150. This was done on Jan. 1, 1923. The results of the operation of the company for 1923 are not as promising as were expected and it was necessary to ask further relief of the City Council. Accordingly on April 27 the company submitted a letter to the City Council in which it pointed out, among other things, that since the company commenced the work under the franchise extension, its financial condition had gradually grown worse instead of better and that it had suffered enormous losses during this period, as shown in the following financial statement:

REPORT OF HOUSTON ELECTRIC COMPANY

Result of operation under franchise extension ordinance and four tokens for 25 cents for year ended March 31, 1923

Gross earnings		$2,021,929
Operating expenses	$1,530,074	
Depreciation	296,957	
Taxes	148,450	
Total		1,975,481
Balance		$46,448

As the company pointed out it was barely earning operating expenses, depreciation and taxes; in fact, the balance of $46,488 earned during this twelve months' period would pay a fair return on less than $590,000 of value.

Stated another way, the return earned during these twelve months was insufficient to pay a fair return on even one-half of the amount of actual cash which the company had expended since the franchise extension ordinance was passed. This statement, said the company, challenged the fairness of every right-thinking man. The responsibility for this condition of affairs was charged to jitney competition and insufficient fares. It said that jitney competition had, in fact, reached a point where either the jitneys must go or the company must fail utterly to function as a transportation system. Against the jitneys these counts were brought:

Jitneys are permitted to operate on the same streets with street cars, thereby furnishing a duplication of service.

Jitneys are permitted to operate within the short-haul radius only. They play no useful part in the upbuilding of a city, nor do they serve outlying territory.

Throughout the city the company has

paid for and maintains approximately 200,000 sq.yd. of paving at a total cost to the company, including bridges and tunnels, of more than $1,100,000, an amount that would have been assessed against property owners and had been saved to them through payment by the company.

Jitneys use this investment to take away from the company the short haul, which is the most profitable part of our business.

Jitneys do not contribute to the upkeep of the streets, but instead are permitted to wear out an investment made by the property owners and by the company.

Jitneys make the operation of street cars more hazardous and add enormously to the already and fast-increasing traffic congestion of our streets.

Jitneys operate as best suits their convenience.

As a first step toward a settlement of the problem the company suggested:

1. That jitney competition be abolished, or;

2. That transportation in the city be divided between jitneys and street cars; the jitneys to furnish transportation to any one entire section of the city, withdrawing street car service therefrom, and the street cars to furnish transportation to the entire other section of the city, withdrawing jitneys therefrom.

JITNEY HISTORY REVIEWED

The City Council asked for time to consider this letter and at the same time give the jitney men an opportunity to present their side of the story. This the jitney men did in a communication addressed on April 30 to the Mayor by R. R. Tripp, recording secretary of Auto Bus Drivers' Union No. 243. The jitney men said that after carefully considering the company's statement and after making an investigation of the existing franchises and city ordinances, they could find no grounds for granting the company's appeal for the elimination of the jitneys. They said that the auto bus drivers were not complaining about the existing conditions and had conceded various reductions without protest, but felt they could not concede any further curtailment.

To this the Council replied, as indicated previously, by voting to reroute the jitneys to streets other than those occupied by the railway.

On its historical side the jitney as a menace to the company dates back to 1914. The first jitney began operation in Houston on Nov. 28 that year. By Dec. 25 there were 625 in operation and in the early part of 1915 there were approximately 900. To combat the jitney service the railway greatly increased service on all lines. However, the people rode in the jitneys in preference to street cars. As a result it became necessary to curtail railway service.

Early in 1916 the City Council passed an ordinance regulating jitneys and fixing the license fee at $36 a year and requiring a bond of $2,500. The cost of the bond was from $125 to $150 a year. The jitney men initiated an ordinance granting jitneys a blanket franchise on all of the streets without license. This was voted down by the people because it completely turned the streets over to the jitneys.

The war-time demand for men practically stopped jitney operation. At one time in 1918 only six jitneys were running, all to Camp Logan, where 30,000 soldiers were stationed. During the general depression of 1920, with many unemployed, the number of jitneys increased so that at the end of the year there were 170 in service.

During the fall of 1922 the company endeavored to obtain the passage of an ordinance extending the present franchise fifteen years and obligating the company to spend $3,000,000 for improvements, $1,000,000 of which was to be spent within sixteen months after the passage of the ordinance and specified that the company be permitted to earn 8 per cent on its property value.

This ordinance was submitted to the people and defeated by a vote of three to one.

Undaunted by this failure the company submitted a proposition asking for a sixteen-year extension to the franchise which expires in 1935, agreeing to spend $1,200,000 for extensions and improvements, within two years from the passage of the ordinance. It further specified that no money could be spent as a part of the $1,200,000 without approval of the City Council. This franchise extension did not state the rate of return allowed on property value.

The City Council passed this franchise in the form of an ordinance on Jan. 20, 1922, and at the same time passed an ordinance requiring the Houston Electric Company to sell tokens at the rate of four for 25 cents, the cash fare remaining 7 cents with universal transfer.

No serious difficulty was experienced in selling these notes, due to the general understanding that the financial condition of the company would be gradually restored to a sound basis through wise and fair regulation by the City Council.

Another Railway Uses Buses in Supplementary Service

The Youngstown & Suburban Railway, Youngstown, Ohio, has begun operation of a bus line between Youngstown and Salem along a route which in general parallels the company's own tracks. The bus line, however, serves several localities more or less remote from the railway. It is felt that the transportation needs of these places justify the establishment of the new service. In fact, wildcat jitneys were already attempting to give service before the railway commenced operation.

Four de luxe buses are used in the new service. They operate between Salem and Youngstown on a two-hour headway during a greater part of the day. The railway gives hourly service to Salem and the bus schedule is arranged to split every second trolley headway. In the evening, the buses do not operate through to Youngstown, but meet cars at Columbiana and carry passengers from that place to East Palestine. The jitneys formerly provided the service between these two points, unloading their passengers at Columbiana for transfer to the railway. When the jitneys commenced to run through to Youngstown the railway took up the matter of bus operation.

Improvement Program at Los Angeles Approved

Following the defeat at a public election in Los Angeles, Calif., on May 1 of two proposals for operation of buses in competition with the electric railways, the plans for extensive improvement of Los Angeles transportation facilities were officially approved on May 7 by the Los Angeles Board of Public Utilities, by granting permits for the operation of buses in connection with the electric cars.

The service improvement program includes construction of new track extensions by the Los Angeles Railway, the operation of buses by the Los Angeles Railway and the operation of joint buses by the Pacific Electric and the Los Angeles Railway under the name of the Los Angeles Motorbus Company.

Operation of One-Man Cars Will Continue in Lansing

As the result of a recent Federal court hearing in Detroit Receiver John F. Collins of the Michigan United Railway will continue the operation of one-man cars on all lines in Lansing. At the hearing Judge Tuttle was presented with a protest against the one-man cars which was adopted by the City Council.

Two months ago the receiver went into court at Detroit with a petition to substitute one-man cars in Lansing which was allowed by the judge, who set a sixty-day test period for the operation of one-man cars. The union was represented at the hearing.

When the trial period was up the court ruled that the dangers of the plan had been exaggerated and gave his consent to the one-man operation for an indefinite time.

Restricts One-Man Cars in District of Columbia

Capt. R. G. Klotz, traffic engineer, as the result of his study of one-man car operation in a dozen American cities, made a recommendation to the Public Utilities Commission that the use and development of this type of car in the District of Columbia for the time being be restricted to the lines on which they are now in operation and that these present lines be fully equipped for one-man operation as an experiment. Captain Klotz submitted with his report a description of the types of one-man cars and how they are operated in New York, Rochester, Detroit, Chicago and Cincinnati. In his report he said:

The opinion of those operating the greater number of such cars is that they should not be placed in use until there are sufficient available to operate an entire line and that their installation should be accompanied by some reduction in the headway. I am inclined to believe that lack of acquaintance with these two pointers or failure to observe them, has had considerable to do with the hostility toward such cars that has been apparent here, as our local cars are undoubtedly equal in type and quality to the best to be found elsewhere and very much superior to the general run of such equipment.

Some weeks ago the commission held

a public hearing on the one-man car argument. The report of Captain Klotz was awaited before a decision was handed down, which is expected in the near future.

Traffic Report at New Orleans Believed to Satisfy Railway

Paul H. Maloney, city commissioner of public utilities at New Orleans, said on May 4 that while the officials of the New Orleans Public Service, Inc., had made no formal announcement in regard to the Beeler report on traffic, they virtually had agreed upon complying with all the recommendations of the report except for a few minor details, which it is expected will be adjusted.

Officials of the New Orleans Public Service, Inc., have already agreed to start work at once toward the widening of St. Claude Street for the construction of the necessary tracks and neutral ground. The proposed Tulane-St. Claude line is the key of the entire Beeler reorganization of the traction system.

Mr. Maloney says that since the publication of the Beeler report, which foretold the widening of St. Claude Street, property owners have jumped the price of their properties to an unreasonable height. Commissioner Murphy is known to object to the city and company facing the heavy expense involved, because of the sudden jump in realty prices along the proposed route. He favors the adoption of another route or resort by the city to court action for the expropriation of the necessary ground under the city's right of eminent domain.

Completion of the new St. Claude-Tulane line as proposed in the Beeler survey will give New Orleans its first complete cross-town line, running from Carrollton Avenue to the sugar refinery at Arabi, in St. Bernard parish. It will do away with the present Tulane belt system.

Completion of the St. Claude-Tulane line, according to Mr. Maloney, will pave the way for other changes and will give the street car company the right-of-way to go ahead with its first cross-city lines from the river to Lake Pontchartrain.

Pass in Effect.—The Seattle & Rainier Valley Railway, Seattle, put into effect on May 7 the wholesale weekly pass. The rate is $1.15. Passes are on sale by all conductors of the line and at company offices.

Bus Experiment at Emporia.—The City Commission of Emporia, Kan., has granted the Kansas Electric Power Company, which operates the local electric railway system, permission to discontinue railway service for six months and to substitute eight buses as an experiment.

I. C. C. Postpones Date of Coupon Book Sale.—The Interstate Commerce Commission has postponed until Jan. 1, 1924, the effective date of its order requiring railroads to issue 2,500-mile interchangeable coupon books at a reduction of 20 per cent from the standard rate of fare. In the meantime it is expected a permanent injunction, granted by the Federal District Court at Boston against enforcement of the order, will be appealed to the Supreme Court.

Bus Rights Granted in Rochester.—The Council of Rochester, N. Y., at a meeting on May 8 granted the New York State Railways, through a subsidiary corporation, the Rochester Co-ordinated Bus Lines, Inc., a franchise to operate buses on Dewey Avenue, as an adjunct to the railway service of the company. It is expected that the line will start operations about June 1, when the crosstown trackless trolley line will also be instituted.

Buses for Auxiliary Service in Trenton.—The Central Transportation Company, with offices at 137 East State Street, Trenton, N. J., has been incorporated by Rankin Johnson, president of the Trenton & Mercer County Traction Corporation; Edward J. Peartree, general superintendent of the company, and Richard Stockton, a director of the corporation. The railway plans to augment its trolley service in Trenton and suburbs with buses. It is proposed to issue transfers from the buses to the trolley and vice versa for 1 cent.

Ten Cents Charged on Milwaukee Buses.—The buses used in the de luxe service started in Milwaukee, Wis., on May 2 by the Wisconsin Motor Bus Lines, a subsidiary of the Milwaukee Electric Railway & Light Company, are being operated entirely independent of the railway, and there is no exchange of transfers or tickets between the two. The bus fare is 10 cents and as far as possible loading is limited to the seating capacity. The starting of this service was referred to briefly in the ELECTRIC RAILWAY JOURNAL for May 12, page 824.

Approve Railless Cars.—Members of the City Council of Philadelphia and officials of the Philadelphia Rapid Transit Company recently visited the works of the J. G. Brill Company to inspect the new trackless trolley which the traction company is planning to operate on Oregon Avenue. W. C. Dunbar, president of the Philadelphia Rapid Transit Company, said that Oregon Avenue was the only route on which the company had definitely decided to operate the new cars. The rate of fare on the trackless trolleys will be the same as on the regular lines.

Annual "Dress-Up Day" in Green Bay.—Sunday, April 15, was "Dress-Up Day" for conductors and motormen of the Wisconsin Public Service Corporation, Green Bay, Wis. Conductors and motormen of all city and interurban cars were groomed in their best. "Dress-Up Day" is an annual custom adhered to by the company as a part of the campaign of trainmen to reduce accidents. Photographs were taken of the crews in two relays, and bonuses earned during the first quarter of the year for freedom from accidents were distributed to employees meriting such awards.

New Fare Tariff Filed.—The Puget Sound Power & Light Company has reported to the City Council of Bellingham, Wash., that it has filed with the Public Works at Olympia a new experimental tariff of four tickets for 25 cents, or a cash fare of 7 cents. The report declared that the present tariff of twenty tokens for $1, or a cash fare of 7 cents, had caused a loss during nineteen weeks of $10,018, compared with the revenue during the 6¼-cent fare in effect during the corresponding period last year. The revenues decreased from $77,638 to $67,620, although the passengers carried increased 6.9 per cent.

More Bus Lines for San Diego.—Claus Spreckels, general manager of the San Diego Electric Railway, San Diego, Calif., has applied to the State Railroad Commission to abandon certain of the company's railway lines and replace them with motor coach service. It is proposed soon to start motor coach service over 17½ miles of streets. The new service involves the abandonment of approximately 8.64 miles of railway including the line to Old Town and portions of the Point Loma line. In order to carry out the plan, additional motor coaches will have to be purchased, but the number required has not yet been determined. The new coaches will be similar in design to those now owned.

Barring One-Man Cars Opposed in Wisconsin.—A unified front was presented by the electric railways in Wisconsin operating one-man cars at the hearing before the corporation committee of the Senate. They attended in opposition to the proposal asking that one-man cars be barred in Milwaukee. The resident engineer of the Railroad Commission at Milwaukee and representatives of the commission in Madison appeared in opposition to the bill along with representatives of the railways. They declared that there are two things to take into consideration in the operation of one-man cars—safety and service, which have been fully exemplified by the one-man cars now in use in different parts of Wisconsin.

Favorable Results Expected.—After watching the results of the operation of the arterial highway ordinance for a week in Green Bay, Wis., Charles E. Warwick, superintendent of the railway department of the Wisconsin Public Service Corporation, stated that the setting aside of arterial highway zones in cities where cars operate will reduce accidents involving street cars and automobiles by 50 per cent on the street where such a safety measure is placed in force. With the streets crowded with new cars and new drivers, the trainmen of the company have staged a special defense against accidents in an effort to keep the number down during this period. Their efforts, coupled with the working of the ordinance, promise favorable results, it is said. In April the number of accidents was less than for any month for more than a year.

Personal Items

A. D. McWhorter Advanced

Engineer Long Connected with Memphis Street Railway Is Made General Superintendent

A. D. McWhorter, recently appointed general superintendent of the Memphis Street Railway, Memphis, Tenn., in charge of transportation, mechanical and overhead line departments, entered electric railway work in Atlanta in 1894 as a conductor with the Atlanta Traction Company. He served in that capacity for about six months. The industry was then just beginning to find itself electrically and mechanically, and an opening being offered in the shops Mr. McWhorter jumped at the chance to have an opportunity to become a factor in the work of "making the wheels go round." His first job in the mechanical department was in maintenance and inspection work as a member of the night force. He served there for two years and was then made night foreman. This position he held for two and a half years.



A. D. McWhorter

Just about this time the Atlanta Traction Company and the Atlanta Consolidated Street Railway were consolidated and Mr. McWhorter was appointed general foreman of the Glenn Street shops, in which capacity he served for a year. He was next transferred to the Fulton County shop, the main shop, and placed in charge of the motor and truck departments. Two years later he was made assistant master mechanic with direct supervision over all carhouses. He served in this capacity for three years, but in March, 1905, resigned to accept the position of master mechanic of the Memphis Street Railway. On Jan. 1, 1916, Mr. McWhorter was appointed superintendent of equipment and overhead lines of the Memphis company, which position he held until April 21, this year, when he was made general superintendent.

Mr. McWhorter is a member of the Memphis Engineers' Club, the American Society of Municipal Improvement, the Memphis Chamber of Commerce and the American Electric Railway Engineering Association. He has always been interested in the work of the last-named body and in 1911 served as co-chairman of the joint committee on engineering accounting, interdepartment charges. At the convention of the A.E.R.A. in Chicago last October he was appointed a member of the committee on wheel tread and rail contours.

Mr. McWhorter was born in Madison, S. C., on June 3, 1877, but was reared in Atlanta.

Chicago Surface Lines Changes Announced

John E. Wilkie, assistant general manager Chicago Surface Lines, has been appointed assistant to the vice-president. He has been connected with the company since 1913 as assistant to the president and assistant general manager. He is also vice-president of the Chicago City Railway, one of the subsidiaries of the Chicago Surface Lines.

Michael Harrington has been appointed assistant superintendent of transportation. Mr. Harrington entered the service of the West Chicago Street Railway in December, 1884, as a horse car driver. In 1903 he was promoted to foreman at the Kedzie Avenue Depot, and at the time of the consolidation of the various companies in 1914 he was made division superintendent.

Joshua Burgee has also been appointed assistant superintendent of transportation. He has been connected with the Chicago companies in various capacities for thirty-eight years, beginning with the Chicago City Railway as a conductor in 1885.

R. M. Jenkins has been appointed division superintendent of the second division. He entered the service of the Chicago City Railway as a conductor in 1889. In 1905 he was promoted to the position of supervisor, which he held until June, 1918, when he was appointed assistant division superintendent at the Burnside Depot.

Andrew R. McDonald, South Kaukauna, a railroad engineer for twenty-three years, has been appointed by Governor Blaine as a member of the Wisconsin Railroad Commission to succeed Henry R. Trumbower, resigned. Mr. McDonald has been a road engineer for the Chicago & Northwestern Railroad since 1900. He was for four years legislative representative of the Brotherhood of Locomotive Engineers, vice-chairman of his railroad organization on the Northwestern system for six years and local chairman of his organization for sixteen years.

Mr. Reynolds Made Manager of the Washington-Virginia Railway

A. L. Reynolds, manager of the Youngstown & Suburban Railway, Youngstown, Ohio, under the management of Day & Zimmermann, has been transferred and promoted to general manager of the Washington-Virginia Railway at Washington, D. C., which property is also under Day & Zimmermann management. In his new post with the Washington-Virginia Railway Mr. Reynolds succeeds M. G. Stratton, who resigned on May 1.

Mr. Reynolds was appointed general superintendent of the Youngstown & Suburban Railway, Youngstown, Ohio, in March, 1921. Shortly thereafter he was made manager of the company. Before that Mr. Reynolds had been foreman of the Snelling car station of the St. Paul City Railway, included in the system of the Twin City Rapid Transit Company. He was in the operating department of the company for about twelve years.



A. L. Reynolds

Mr. Reynolds began his railway training in the operating department of the Northern Ohio Traction, Light & Power Company in 1907. The following year he took a position as salesman with the B. F. Goodrich Company, and after remaining with that concern for a year he again took up railway work with the operating department of the St. Paul City Railway as supervisor of transportation. Before the entrance of the United States into the war in 1917 Mr. Reynolds went to the Second Officers' Training Camp at Fort Snelling, Minn. He received there a commission as first lieutenant in the infantry.

Upon his return to civil life in 1918 he became identified with the Minneapolis Street Railway. During the latter part of 1918 he conducted for the company many public meetings in connection with its campaign to explain to the people the cost-of-service franchise which the company was seeking to obtain from the city.

In 1919 Mr. Reynolds was again transferred to the St. Paul City Railway by the Twin City Rapid Transit

Company, and while with that company he acted as supervisor and also in various other capacities. Mr. Reynolds was born in 1886 in Ashland, Ohio. He received his education in the grade schools of Akron, Ohio, and later attended Kenyon Military Academy at Gambier, Ohio. He is a graduate of Kenyon College, also in Gambier.

Philadelphia Newspaper Man Appointed to Pennsylvania Bureau

J. S. Stewart Richardson, formerly city editor of the Philadelphia *Public Ledger*, has been appointed director of its bureau by the recently formed Committe on Public Utility Information for the State of Pennsylvania. The temporary committee was headed by P. H. Gadsden, vice-president of the United Gas Improvement Company and former president of the American Electric Railway Association. For the present, at least, Mr. Richardson will make his headquarters at the office of the U. G. I. in Philadelphia.

Mr. Richardson is fairly well known to newspaper men throughout the entire State and is intimately known to the Philadelphia editors and the other newspaper men all along the line. He was born in England, and during the World War served as a Major in the forces of the U. S. A.

Officers Elected for Companies at Pottsville

The Eastern Pennsylvania Railways on March 26, 1923, was merged with its subsidiaries into the Eastern Pennsylvania Power & Railway Company. This company is located at Pottsville, Pa. Its officers are as follows: President, J. H. Pardee; vice-president, J. K. Choate; vice-president, R. W. Leigh; vice-president, J. I. Mange; secretary and treasurer, T. W. Moffat. The East Penn Electric Company, which holds approximately 99 per cent of the outstanding stock of the Eastern Pennsylvania Power & Railway Company, and into which the Eastern Pennsylvania Power & Railway Company will shortly be merged, has the following officers: President, J. H. Pardee; vice-president, J. I. Mange; vice-president, J. K. Choate; secretary and treasurer, T. W. Moffat.

Julian C. Smith Succeeds E. A. Robert at Quebec

Julian C. Smith has been elected president of the Quebec Railway, Light, Heat & Power Company, Quebec, Que., succeeding E. A. Robert. Several of the old directors resigned and their places filled by officials representing the Shawinigan Water & Power Company.

Samuel Cochrane has been promoted to the position of superintendent of maintenance of the railway department of the East Penn Electric Company, Pottsville, Pa.

Interstate Commissioner Goes to Yale

Winthrop M. Daniels Has Been Selected to Occupy Chair on Transportation at New Haven

Announcement was made in Washington on May 17 that Winthrop M. Daniels, Interstate Commerce Commissioner, will become professor in the Strathcona School of Transportation, Yale University. Since its receipt a few years ago of the endowment for this school under the will of the late Lord Strathcona, Yale has been planning the organization of a faculty to teach transportation. Its present staff includes Professor Dudley, formerly with the Westinghouse Air Brake Company, on the mechanical engineering side of transportation, and Charles J. Tilden on highway transport. Mr. Daniels' work will be confined largely to public policy toward transportation utilities, including in these utilities steam railroads, bus and truck transportation, electric railways, inland water transportation and transportation by air. In his second term, Mr. Daniels expects to take up a special course in the valuation of utilities and a course for graduate students on regulation of utilities.

Mr. Daniels is a native of Ohio and a graduate of Princeton University, where he was professor of political economy from 1892 to 1911. In the latter year he resigned to become a member of the Board of Public Utility Commissioners of New Jersey, on which he served until he was appointed in 1914 a member of the Interstate Commerce Commission. In 1918-1919 he was chairman of the Interstate Commerce Commission. He is the author of a number of books on financial and other topics. His resignation as a member of the Interstate Commerce Commission becomes effective July 1. The President has designated Frank McManamy as his successor.

Jason C. Leighton has been made vice-president of the El Paso (Tex.) Electric Company, to succeed Donald C. Jewett. Mr. Leighton is located in Boston at the main office. The other vice-presidents are Norman W. Mumford and Joseph Remick.

Samuel H. Sarena, formerly superintendent of transportation of the New York & Queens County Railway, New York, N. Y., has accepted the position of superintendent of the railway department of the East Penn Electric Company, Pottsville, Pa.

George B. Reamer, auditor of the Youngstown & Suburban Railway, Youngstown, Ohio, will act as manager of that company, succeeding A. L. Reynolds, whose appointment to the Washington-Virginia Railway at Washington, D. C., is noted elsewhere in this department.

Hugh Pattison has been appointed engineer of electric traction of the Virginian Railway, with headquarters at Norfolk. He comes to this position from the Illinois Central Railroad, with which for the past two years he has been engaged on preparation work for the coming electrification of the Chicago terminal.

Alvin Coffman has been appointed claim agent for the Chicago & West Towns Railway, with offices at Oak Park, Ill. His appointment became effective on May 1. Mr. Coffman is a native of Philadelphia. He first engaged in electric railway work in Roanoke, Va., where for a number of years he served as superintendent of transportation and claim agent. Later he assisted in establishing and conducting a joint claim adjusting bureau in Dayton for the City Railway, the People's Railway and the Oakwood Street Railway. He resigned from the service of the companies in Dayton to engage in war work.

Obituary

John M. Egan

John M. Egan, seventy-five years old, former president of the Metropolitan Street Railway and the Kansas City Light & Power Company, Kansas City, Mo., dropped dead on the stage of the new Amboy, Ill., Township High School Auditorium on the night of May 9.

Mr. Egan, who was reared in Amboy, had just concluded his number on the program, having recounted his school-days in Amboy and recited five verses of Longfellow's "Psalm of Life." It is believed the excitement brought on a heart stroke.

He started his railroad career as a boy in the shops of the Illinois Central at Amboy about sixty years ago. Several years later he went to St. Louis, Mo., as assistant engineer of the Southern Missouri Railroad, and later to Lacrosse, Wis., as chief engineer of the Southern Minnesota. He also served as president of that road. A few more years found him general superintendent of the Western Division of the Canadian Pacific, then under construction from Winnipeg west. He also helped to construct the Great Northern from Minot, N. D., to Helena, Mont., a distance of 1,200 miles. Later he was general superintendent of that road and subsequently president of the Great Western.

Going to Savannah, Ga., he became president of the Georgia Central, but after a brief stay went to Kansas City, Mo., to become president of the company that built the new Union Depot there. From Kansas City he went to South America to take the vice-presidency of the Brazil Railway. Two years later, or in 1910, he returned to Kansas City as president of the Metropolitan Street Railway and Kansas City Light & Power Company. After six years of strenuous work in that position he retired in 1916 and returned to Amboy.

Mr. Egan was born in Springfield, Mass. His wife, three sons and two daughters survive him.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

$1,800,000 Car Contract Contemplated

Pacific Electric Railway Proposes to Order Fifty All-Steel Interurban Cars

The Pacific Electric Railway, Los Angeles, Cal., has announced that fifty new all-steel interurban passenger cars will be purchased immediately at a total cost of $1,800,000, each car to cost $37,000. Bids have been asked for the proposed new equipment and the earliest possible date of delivery specified.

The new cars each will seat sixty passengers and will be similar in type to the present all-steel interurban cars known as the 1,200 class now in service on the company's Long Beach and San Bernardino lines. End vestibules will be unusually wide and of the inclosed type, with double entrance.

During the past year the Pacific Electric lines have placed orders and had delivered more equipment, both passenger and freight, than for any similar period in the history of the company. With the order for the new interurban cars now being placed and 100 new cars for the Hollywood service, fifty of which are in service and fifty on order, the company, in the past year, will have contracted for 150 passenger cars, costing $3,687,000. Also for passenger service the company has contracted for a total of eighty-one motor buses, some of which have been delivered.

Regarding freight equipment on order delivery to the company has been partially completed on orders for 400 dump cars, 300 box cars, 150 flat cars and 10 electric locomotives, the total cost of which is $2,225,000, making passenger and freight equipment purchases total $6,562,000. The company states that the steady increase in population of all cities of southern California and the enormous growth of the Los Angeles harbor traffic have made these purchases necessary to keep pace with the industrial expansion.

Steel Contact Wire Discontinued

The Erie Railroad was one of the pioneers in electrification, having installed the Westinghouse single-phase system on the branch line between Rochester and Mount Morris in 1906. This work was done for the railroad by Westinghouse, Church, Kerr & Company (later absorbed by Dwight P. Robinson & Company).

The contact system is of the double catenary type, that is, there is a catenary "messenger" of steel in this case, a secondary supporting wire of hard-drawn copper, and a contact wire of steel. The last-named was added about ten years ago, but the railroad has now purchased Phono-electric wire for the 19-mile stretch between Rochester and Avon. The wire is on the ground and will be installed as soon as weather conditions permit.

$12,263,485 Net for Westinghouse

The statement of the Westinghouse Electric & Manufacturing Company submitted to the New York Stock Exchange for year ended March 31, 1923, shows net income of $12,263,485, after inventory adjustment, charges and federal taxes, equivalent to $8.19 a share ($50 par) earned on outstanding $74,812,650 combined preferred and common stocks (the two issues sharing alike in dividends after 7 per cent on the common). In previous year net was $5,837,389, or $3.80 a share. Property and plant are carried in the balance sheet at $50,055,473 compared with $39,347,074 in 1920.

World Stocks of Staple Commodities Are Lower

A recently published memorandum dealing with the world's stocks of fourteen staple commodities shows that in general the stocks were lower on Jan. 1, 1923, than at any other time in the last three years. This is particularly true of the commodities in demand by electric railways. The stocks of such metals as copper, lead and spelter are all very low. Tin, on the other hand, is fairly plentiful, and the stocks of rubber and crude oil have increased.

The results of the survey, which is the work of J. M. Keynes of Cambridge University, may be briefly summarized as shown in the table below.

A few figures for March 1, 1923, which are available show a continuation of the downward trend.

WORLD STOCKS OF STAPLE COMMODITIES

	Copper (Thousand Tons)	Tin (Thousand Tons)	Lead (Thousand Tons)	Spelter (Thousand Tons)	Rubber (Thousand Tons)	Crude Oil (Million Barrels)
Jan. 1, 1920	900	35	101	61	142	128
Jan. 1, 1921	822	27	72	81	207	134
Jan. 1, 1922	451	53	21	72	216	170
Jan. 1, 1923	319	38	1	17	248	248

Analyses of Samples and Delivered Coal Vary

Purchaser May Be Misled by Placing Dependence on the Former—Bureau of Mines Publishes Analyses

In using coal analyses it should be recognized that there is a decided difference between mine samples and samples from deliveries. Mine samples are important for determining the character of the coal in any given mine or district, and to the experienced purchaser they may serve as a sufficient guide in the purchase of coal. An average purchaser, however, may be misled by dependence on mine samples because the quality of coal indicated by the mine samples can rarely if ever be attained in the coal delivered.

Return to High Standard Difficult

Impurities eliminated from the formally prepared mine sample may not be eliminated in the production of large tonnage. If the roof and floor are friable or soft, pieces of them may be included in the coal shipped. When prices are high and competition is not keen it is easy for both the miner and the management to lower the standard of preparation of the coal, and the return to a higher standard is always difficult.

The Bureau of Mines has developed specifications for the purchase of coal that require a guaranteed analysis and contain premium and penalty clauses. A sample weighing not less than 1,000 lb. is systematically collected while coal is being loaded or unloaded.

Analyses Being Published

In using analyses of samples of delivered coal the reader must recognize that impurities are not uniform and some variation in the results obtained are consequently to be expected. When a considerable number of such analyses are available the average value and range of variation of a particular coal become known with assurance, and with allowance for variations, delivered coal can be sampled with sufficent accuracy. The Bureau of Mines is now publishing analyses of mine samples and delivered coal in a series of pamphlets by separate states.

Metal, Coal and Material Prices

	May 15, 1923
Metals—New York	
Copper, electrolytic, cents per lb	15.437
Copper wire base, cents per lb	19 00
Lead, cents per lb	7 175
Zinc, cents per lb	6.82
Tin, Straits, cents per lb	41.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$6 875
Somerset mine run, Boston, net tons	3.125
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.75
Central, Ill., screenings, Chicago, net tons	1.87
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft., cents per lb	7.75
Weatherproof wire base, N. Y., cents per lb.	19.25
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.16
White lead, in oil (100-lb. keg), N. Y., cents per lb	13.375
Turpentine, (bbl. lots), N.Y., per gal	$1.20

Rolling Stock

Moncton Tramways Light & Power Company has purchased and placed in service twelve new Birney safety cars.

Gary Street Railway, Gary, Ind., has ordered from the General Electric Company four car equipments with 265 motors and K-63 control and CP-27 air compressors.

Milwaukee Electric Railway & Light Company has ordered from the General Electric Company one hundred G-E 247 motors, which will be used on remodeled cars.

Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, suffered the loss by fire on May 10 of two passenger cars. Three other cars were damaged. The estimated loss is $40,000.

Indiana Service Corporation, Fort Wayne, Ind., has ordered from the General Electric Company ten four-motor 264 car equipment and CP-27 compressors for use on light-weight interurban cars.

Birmingham Railway, Light & Power Company, expects to purchase twenty new cars as a result of the agreement reached with the city, of which mention is made at length elsewhere in this issue. The company also expects to remodel present rolling stock to meet requirements of the revised "Jim Crow" ordinance. This remodeling work will be done in its own shops.

Menominee & Marinette Light & Traction Company, Marinette, Wis., has announced that the four used cars which have been received from the Wisconsin Public Service Corporation at Green Bay for local use in Marinette will be overhauled, re-equipped and put into condition to be used as spare cars, replacing the old style trailers which were used during the summer.

Lake Superior District Power Company, Ironwood, Mich., has received its new rolling stock, orders for which were placed several months ago. The equipment includes four of the smaller type of cars and five of the larger. The smaller cars, for use on the local system, have a seating capacity of thirty-two and the larger cars, for use on the interurban system, have a seating capacity of sixty-four.

Los Angeles Railway has placed an additional order for twenty-five steel cars with the St. Louis Car Company. The cars will be of type "H," similar to the seventy-five already in operation in Los Angeles. Fifty cars were ordered at the first of the year for delivery this summer. The additional twenty-five cars are scheduled to be delivered next fall. While the seventy-five new cars are being built in the East, the Los Angeles Railway has started a program for construction of fifty-five type "H" cars in its own shops. The work on the first car has been begun, but the greater part of the program will be carried out in a new mill building which will house forty-five cars. The type "H" cars are 48 ft. long and seat fifty-four passengers. They are equipped with cross seats throughout and have an inclosed center section and open sections at both ends. They are equipped for operation as single units or in two-car trains.

Track and Roadway

Windsor, Ont.—Mayor Wilson has signed the by-laws authorizing the expenditure of approximately $1,000,000 to rehabilitate and build extensions to the electric railway.

Montreal Tramways will soon proceed with the double-track extension on Rosemount Boulevard between Papneau Avenue and First Avenue, Rosemount.

Erie Railroad, Rochester, N. Y., is planning to extend its electric line from Mount Morris to Dansville and from there into Hornell. It is reported that most of the rights-of way for the new line between Dansville and Hornell have already been secured.

Milwaukee Northern Railway, Cedarburg, Wis., is being urged by the Green Bay Advancement Association to extend its trackage to North Milwaukee. This organization has also asked for the double-tracking of the company's line on Atkinson Avenue between the Green Bay Road and Eighteenth Street.

Wisconsin Railway, Light & Power Company, Winona, Minn., following the completion of track improvement work on the north side of La Crosse will be at liberty to begin work on track improvement work on Main Street. It is the plan of the company to double-track this downtown street from Seventeenth to Twenty-third Street.

San Antonio, Medina Lake & Western Railroad, San Antonio, Tex., will soon start construction of the line which will open up a modern and up-to-date summer and winter resort at Medina Lake, 40 miles west of San Antonio. It is the company's intention to operate gas-electric interurban service between these two points. At a later date the company will also consider the construction of an electric line between San Antonio and the Lake. The gas-electric interurban service planned by the company is in conjunction with its proposal to build a standard gage steam railroad from San Antonio northwest to Sonora and San Angelo, a distance of 274 miles, passing through the towns of Rio Medina, Utopia and Rock Springs.

Shops and Buildings

Columbus, Delaware & Marion Electric Company, Columbus, Ohio, have let contracts for the construction of a boiler of 1,000 hp. at its power plant in Scioto.

Denver Tramway is installing two 10,000-kw. turbines in its Fourteenth and Platte Streets plant. When installed the plant will have a capacity of 30,000-kw.

Cleveland Railway will build six new automatic substations, according to Joseph H. Alexander, vice-president. The total cost of these new stations will be $1,500,000 and will increase the number of automatic substations in Cleveland to nine. A contract has been made with the Westinghouse Company for the equipment for two of the stations that are to be built immediately. As soon as the new stations are completed, the Cleveland Railway will purchase all of its power from the Cleveland Electric Illuminating Company, from which it is now receiving approximately 80 per cent of its current.

Trade Notes

Arthur C. Sullivan, formerly connected with the Rail Welding & Bonding Company, Cleveland, has been made special representative for the Holland Trolley Supply Company, Cleveland.

George Macnoe, manager of the Boston office of W. B. Connor, Inc., has been recalled to New York to take charge of the contractors sales department, handling heating and pumping equipment.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., recently announced personal changes: C. W. Jones has been appointed general foreman of the controller department. C. A. Fike has been appointed general foreman of the coils and insulation department. J. H. Hartman has been appointed general foreman of the storekeeping department. W. S. Oswald has been appointed general foreman of the railway motor department. All these departments are located at the East Pittsburgh works.

Conveyors Corporation of America, Chicago, announces the appointment of the Pittsburgh Machine Products Company, Oliver Building, Pittsburgh, as district representative. The Pittsburgh organization will handle the sale of American steam jet ash conveyors, air-tight doors and cast-iron storage tanks in western Pennsylvania and the northwestern part of West Virginia. The Pittsburgh Machine Products Company is an organization of experienced ash disposal engineers, having handled the sale of Green steam jet ash conveyors, full rights to which were recently purchased by the Conveyors Corporation.

Johns-Pratt Company, Hartford, Conn., announces that arrangements have recently been made with the Curtin Mill Supply Company, Houston; Globe Supply & Machinery Company, New Orleans; Hide, Leather & Belting Company, Indianapolis; Hardy & Dischinger, Toledo; Rathbun Company, El Paso; the Miller Supply Company, Huntington; Walworth-Ohio Company, Cleveland, and the Wayne Belting & Supply Company, Fort Wayne, as distributors of its power plant specialties, vulcabeston products, including compressed asbestos red fiber sheet packing, asbestos valve stem and rod packing, asbestos air pump packing, asbestos pump valves and asbestos valve disks.

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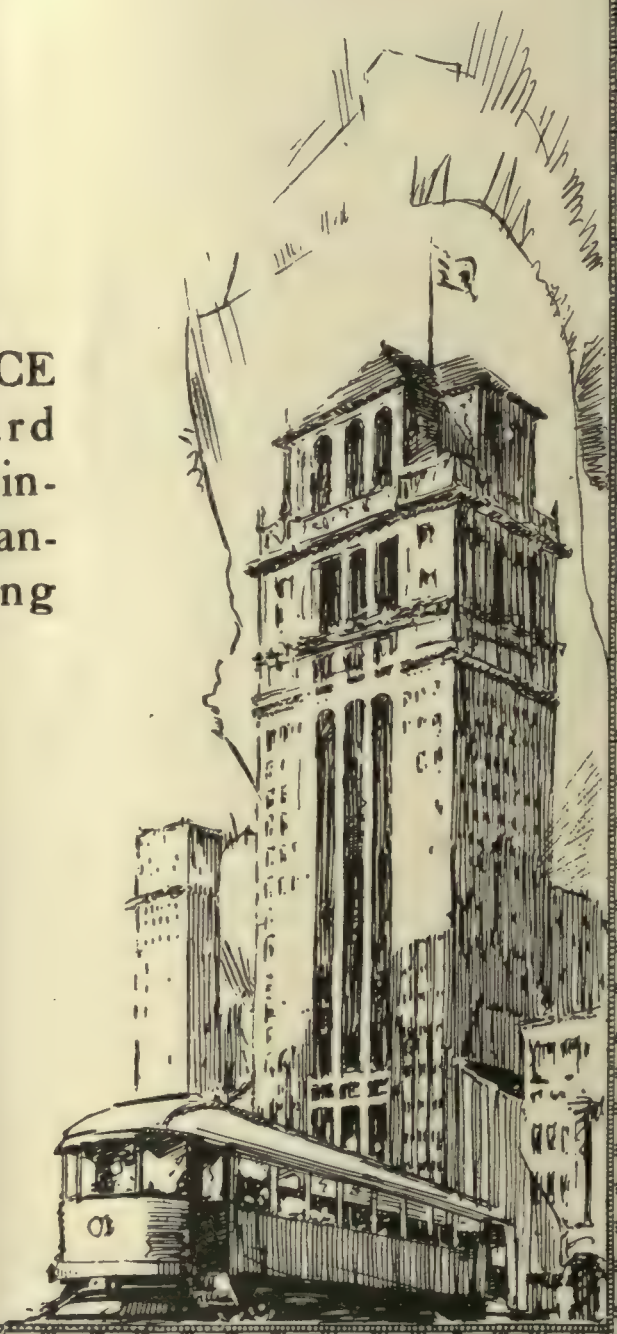
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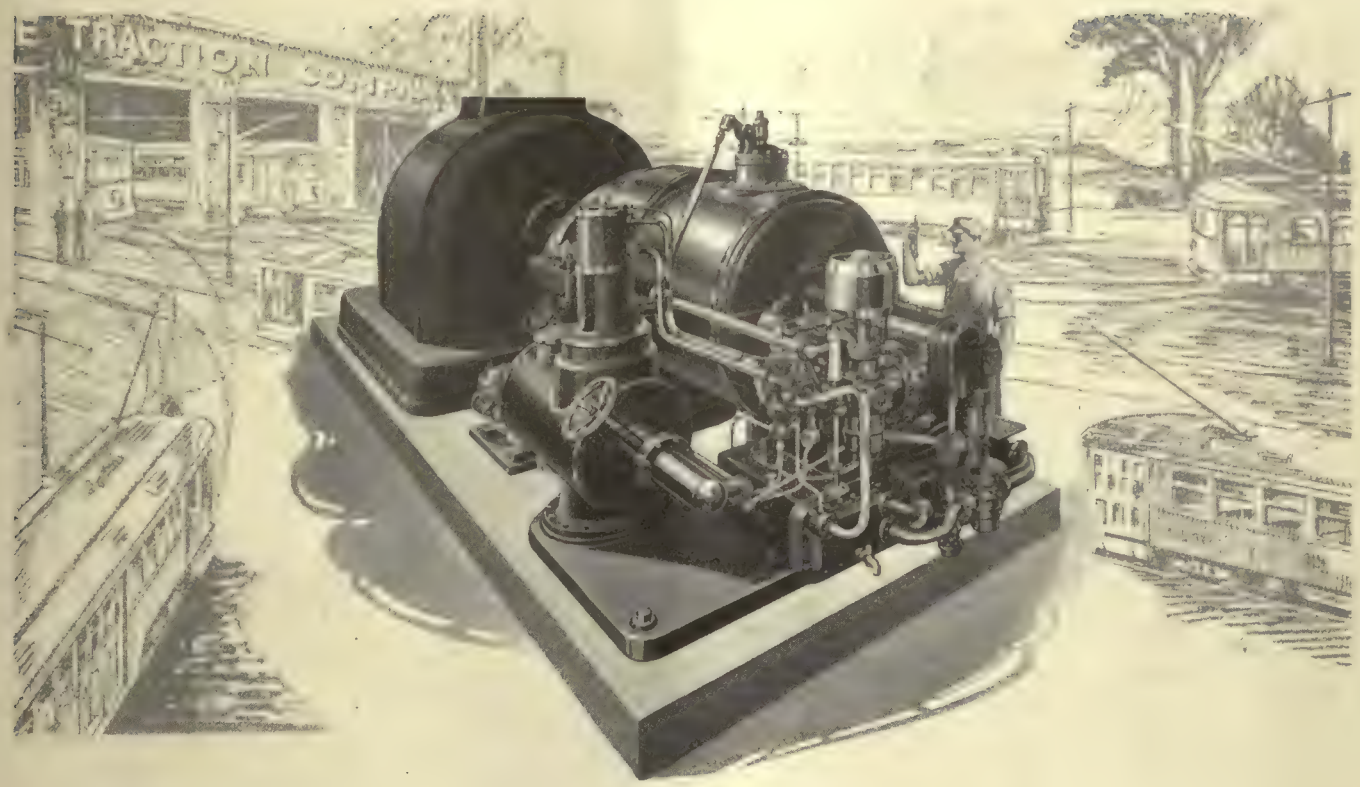
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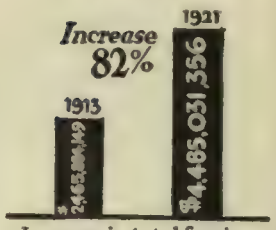
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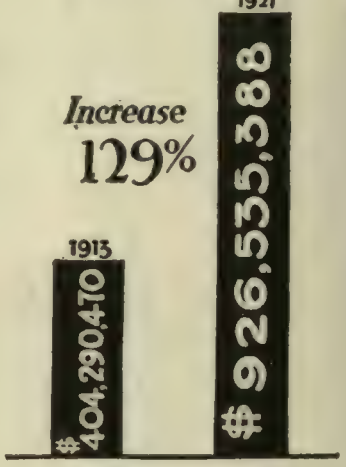
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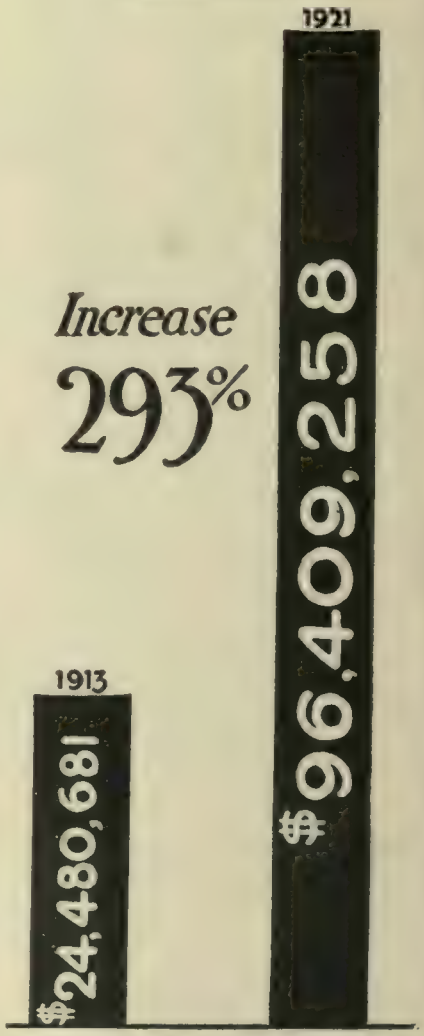
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No Lubrication Required.

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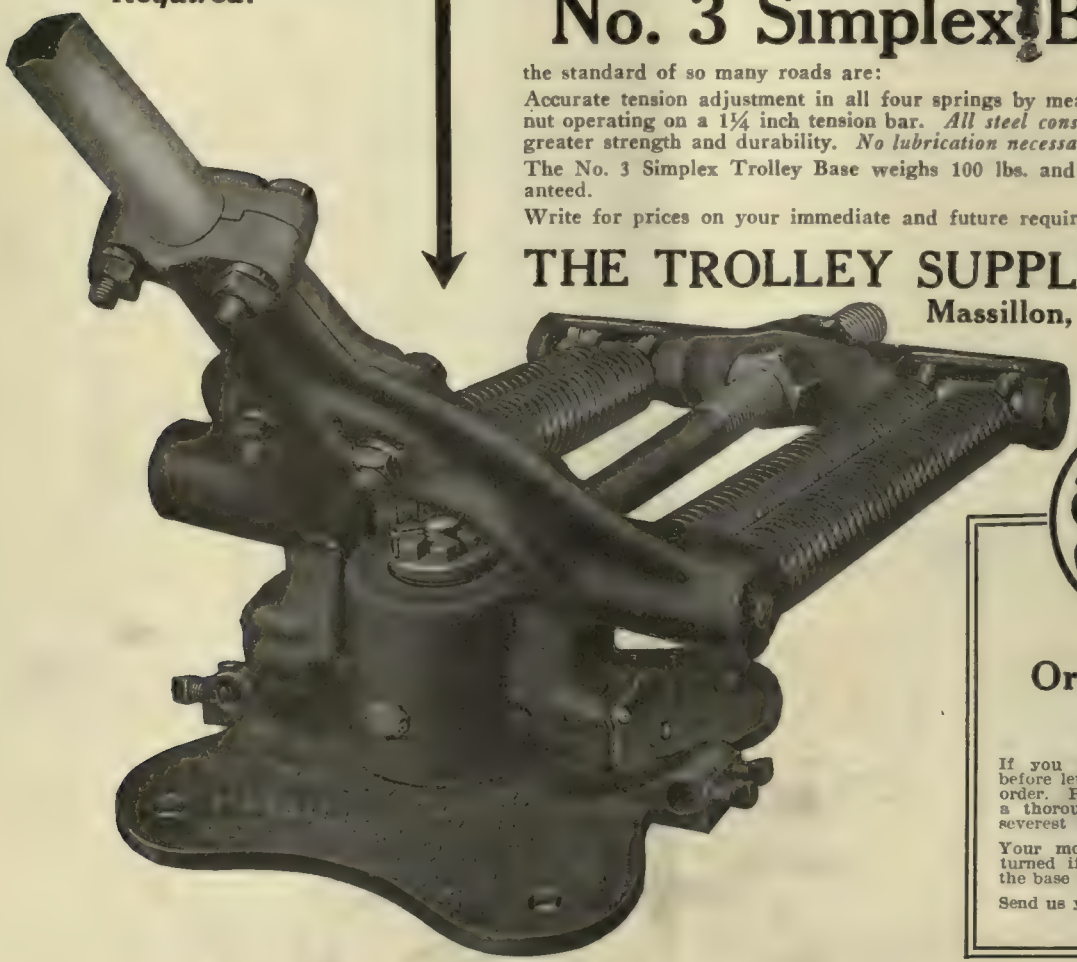
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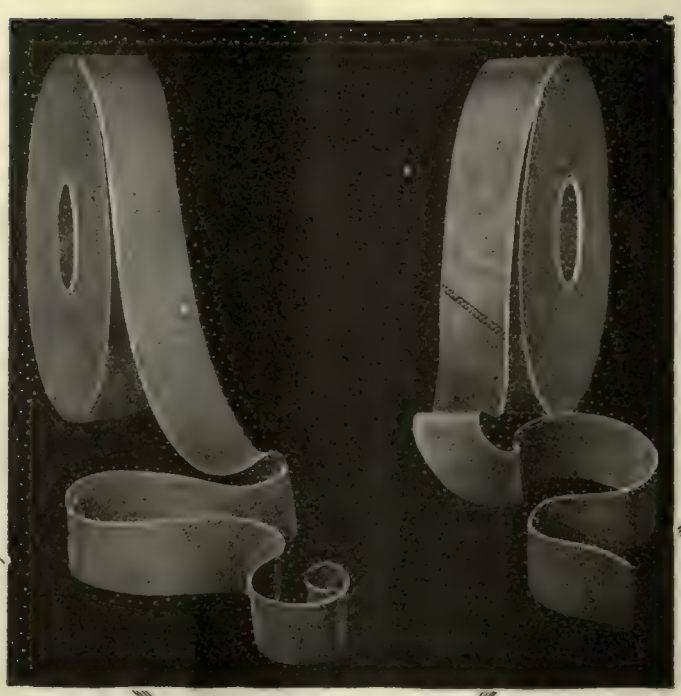
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Sewed Bias Tape

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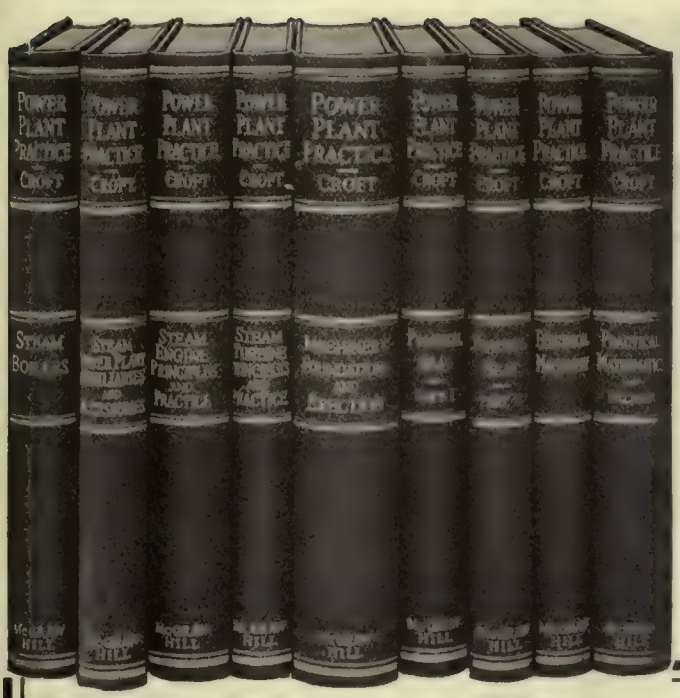
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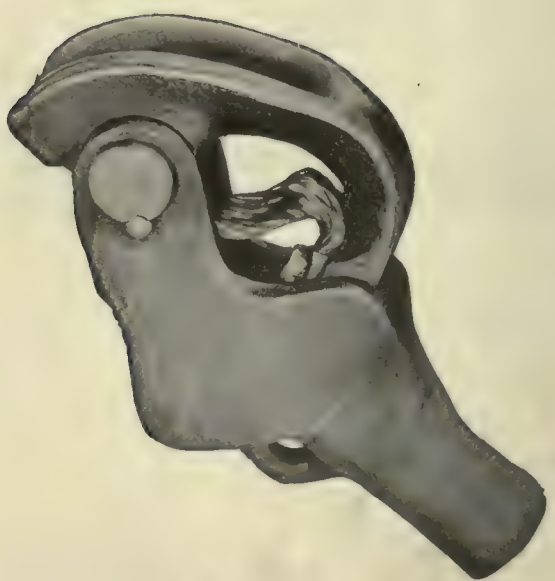
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This protection means much, both to the railway company and the public

A Life Saved by a Life Guard

Don't experiment when success and life saving can be obtained by using

News item from Brooklyn Daily Eagle, April 26, 1923

Miracle Saves Boy From Death Under Trolley Car

Michael Dulio, 7 years old, was knocked down and run over this morning by a car of the hobbleskirt type of the Graham ave. line on Flushing ave., near Jay st. The street was crowded at the time and when the boy was struck by the car while he was running blindly across the street men and women involuntarily cried out in alarm. The motorman of the vehicle, Lawrence Rogerson of 17 Engert ave., applied the airbrake so suddenly and brought the car to a standstill in such double quick time that the few passengers on their way from Manhattan were thrown from their seats. The child was swept under the car and everybody thought he had been crushed to death.

Patrolman John L. Crehan saw the accident and ran forward to help. He dropped prone to the street and crawled under the car, expecting to find the child's mangled body there, but he got a pleased disappointment when he saw the little fellow, bleeding from some cuts on his head, perched safely on the emergency fender, which drops automatically and picks up such little victims.

"Don't get hurted, Mr. Policeman, like I did," chirped the little chap, who was not even crying.

The burly 6-foot officer picked the child in his arms and backed out to brighter daylight with him. An ambulance had been called and Surgeon Feinsot, of the Cumberland Street Hospital, came with it and made a careful examination of the boy. There were no broken bones, and only cuts on the head, which are superficial and will soon heal. Michael was taken home, and his mother, hysterical, was soothed and reassured when Michael threw his arms around her neck and cried "Don't cry, mother, I'm not hurted much."

The mother gathered him into a close embrace and smothered the sticking plaster with kisses. She has her troubles, for there are three little Dulios and a father who is hopelessly ill, in a hospital. She has been supporting the family by working in a candy factory.

Mike's home is at 214 Hudson ave. and he attends public school No. 14, at Concord and Navy sts. He was hurrying to school at 8 45 o'clock this morning and thinking he saw his teached across the way, ran over in a blind hurry to overtake her. He did not notice the car and the motorman did not see him.

H. B. LIFE GUARDS

Manufactured by the Consolidated Car Fender Co.

—are on the cars of the street railway systems of New York and Brooklyn.

We could build lighter and cheaper guards, but—

Why gamble with life—

when our experience on roads all over the world, wherever our H. B. Life Guards are used, shows that sound construction is necessary.

The news clipping, shown above, sure looks as if it pays to use the best.

CONSOLIDATED CAR FENDER COMPANY, Providence, R. I.

Gen. Sales Agents—WENDELL & MACDUFFIE CO., 110 E. 42nd St., New York City

To Boards of Directors that Direct

THERE are two kinds of "good-will" that make a business valuable. One is the good-will of the public. The other is the good-will of your workers. Each can be acquired only by careful cultivation. Both are necessary to the profitable conduct of any industry. Neither pays dividends until it results in favorable action.

Many directorates devote great effort to cultivating public good-will, but disregard the attitude of their labor. They point pridefully to climbing sales curves, but are forced to curtail dividends. They fail to appreciate the difference between passive and constructive good-will on the part of employes.

It is not enough that your workers are tolerant of present conditions. The "urge to do"—the urge that makes better workers, happier families and more prosperous communities—may be entirely lacking in a body of employes who present every outward sign of contentment. Their apparent good-will may be merely passive. Appreciable losses will be sustained all along the line, from the brownstone front to the vine-clad cottage, until you lift the worker's mental machine out of its rut of inertia.

Happily, the worker is a *thinker*. More a thinker than most would imagine. He *can* be taught the real meaning and purpose of labor. And once his interest is aroused, through the proper appeal, he brings to his work a constructive good-will that saves a loss of as high as one dollar in every four now invested in your payroll.

You owe it to your employes, and to the stockholders—your employers—to create in your labor the right sort of "good-will."

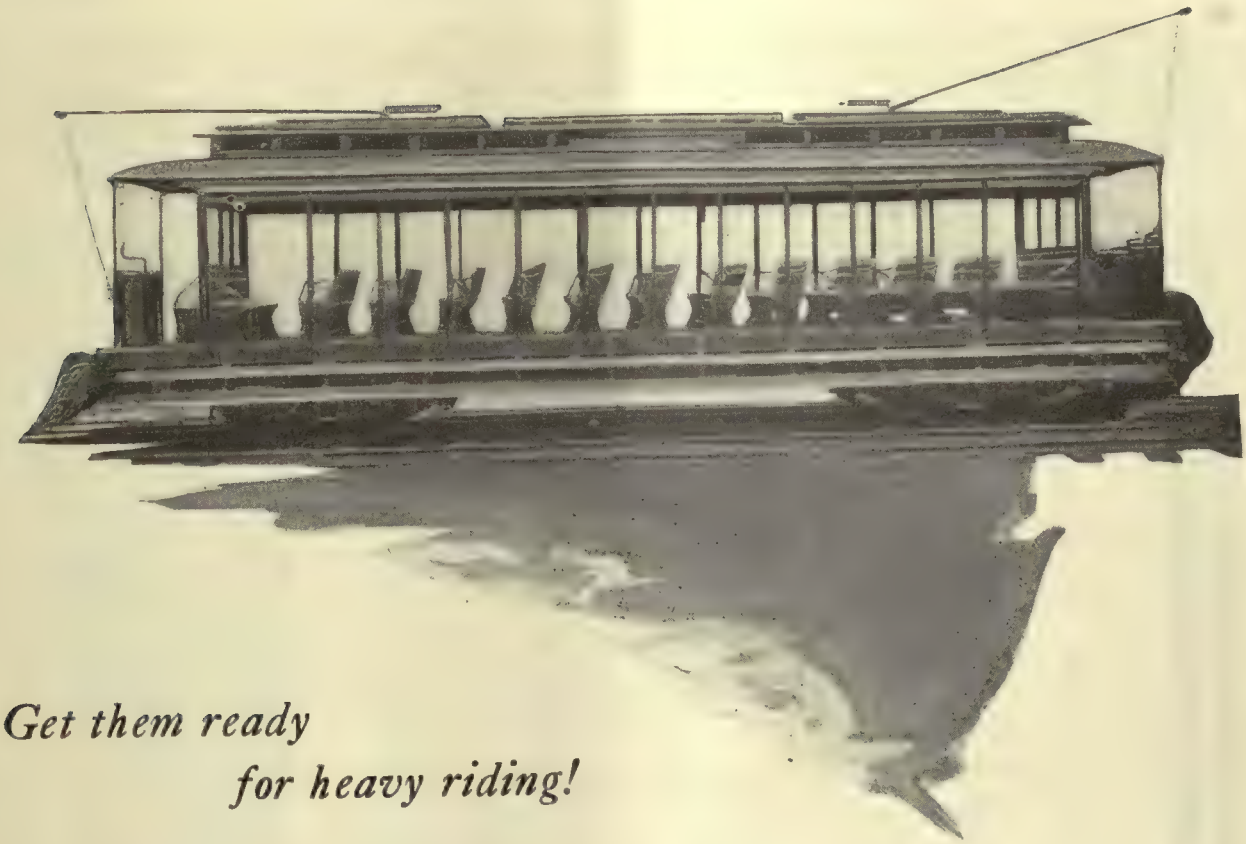
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Write for full particulars and prices

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Consolidated Heaters are light weight and compact, clean, sanitary and safe. The heating elements give a large heating surface with rapid radiation, supplying maximum heat with minimum current consumption.

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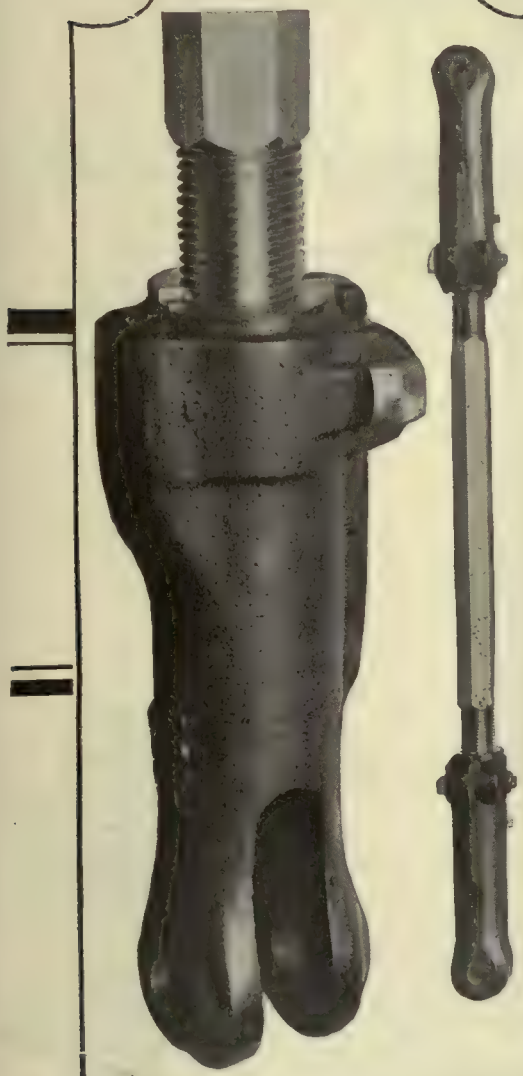
TRUSS PLANK HEATERS
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30 years of heater building has placed us in possession of valuable data on car-heating costs which we shall be glad to place at your service.

Write us.

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PRECISION ROLLER BEARINGS



"R" TYPE

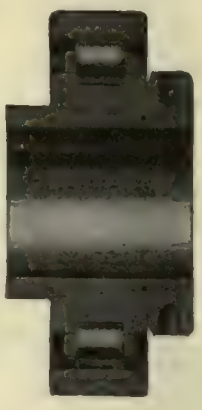
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"RN" TYPE

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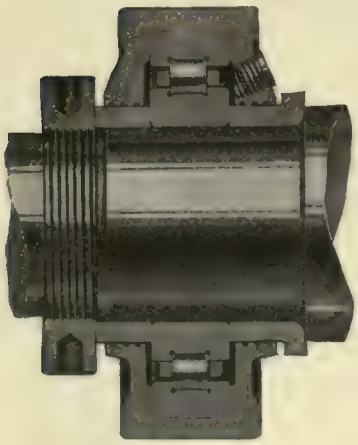
Equipped with clamping sleeve and nut. Made to inch dimensions in light and medium series.



"RTN" TYPE

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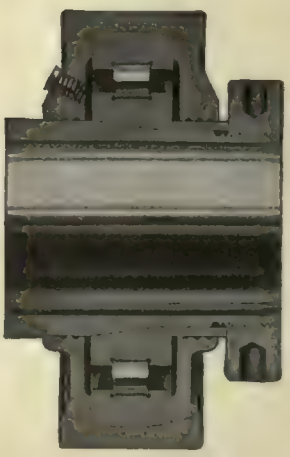
Equipped with clamping sleeve and nut. Made to inch dimensions in light and medium series.



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Our engineers will welcome an opportunity to work with yours, in the application of these high-duty precision bearings with a view to securing maximum anti-friction efficiency.

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—Let us send our catalog—

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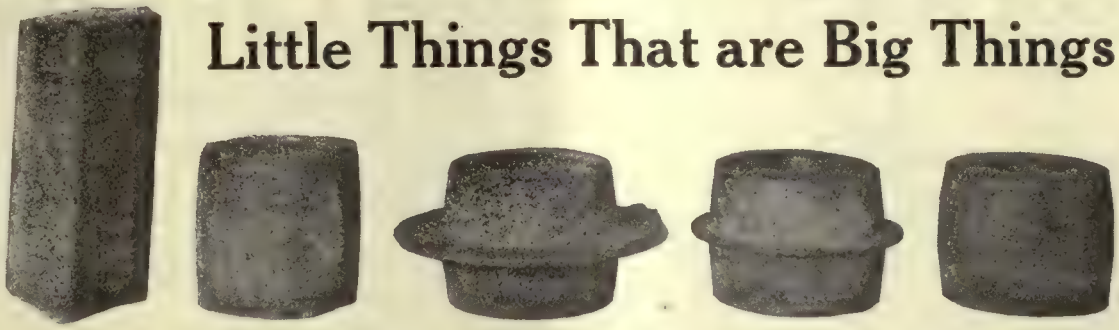
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It dries into a smooth elastic surface and lasts for surprisingly long periods of time, records running from 5 to 15 years on various metal and wood surfaces.

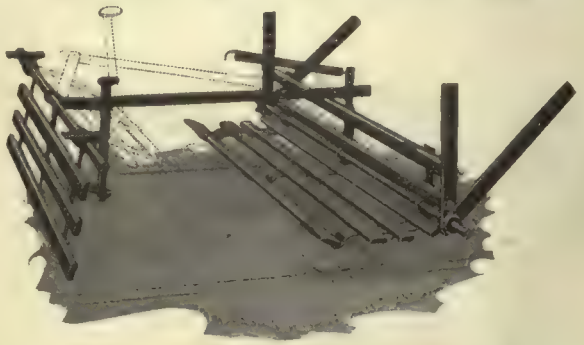
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The guard that works perfectly

Costs no more

Abundant references gladly furnished to verify the above claims.

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SPECIFY ROOT ALL SPRING STEEL LIFE GUARDS on your cars

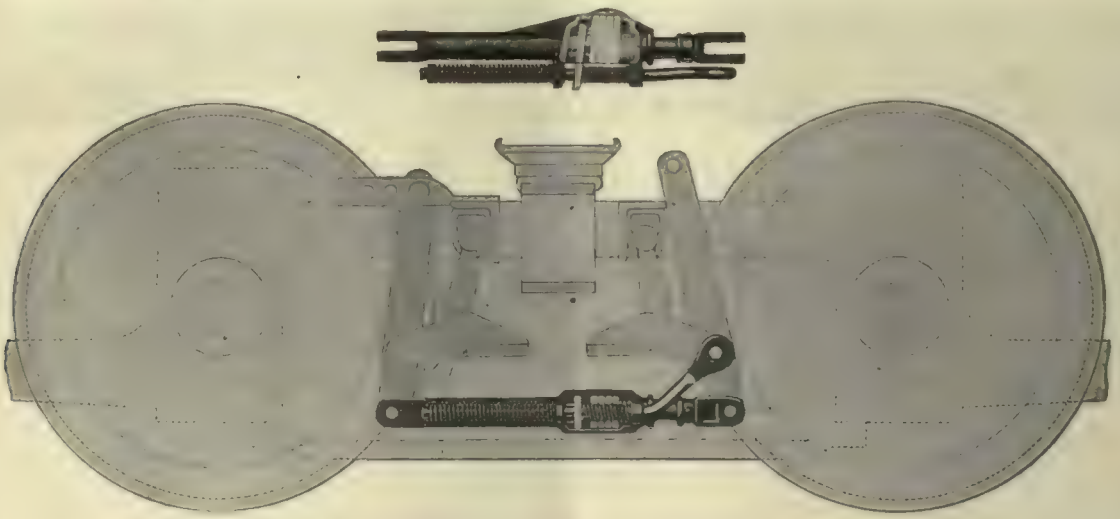
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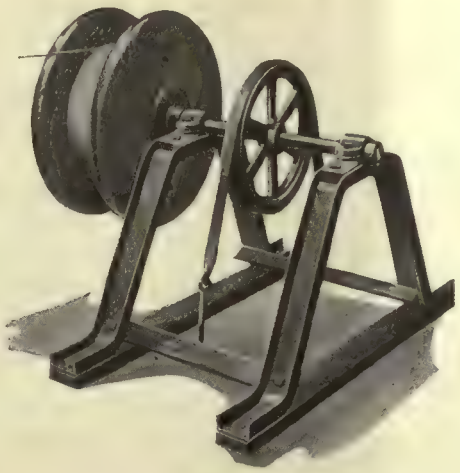
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Makes your car fit to run and remain in service.
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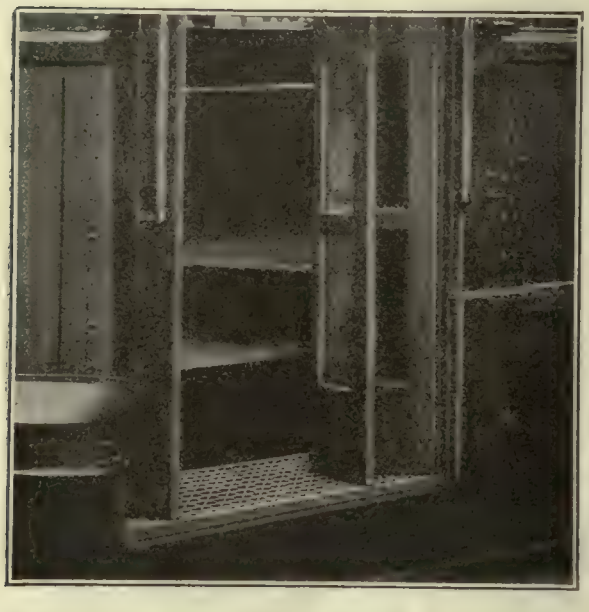


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Sleet Cutters
Bases with Detachable Pole Clamps

Bayonet Trolley Harp Co., Springfield, Ohio

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THE BIRTHPLACE OF THE SAFETY CAR



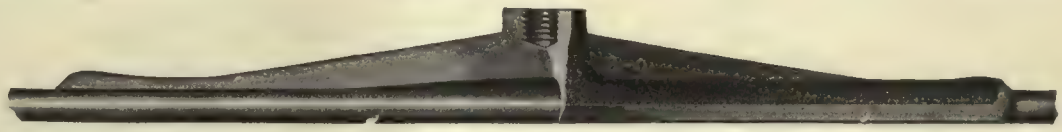
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"The Birthplace of the Safety Car"



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Prevents Hard Spots

The simple and effective protection of the wire at the center section of this cushion ear ends the destruction and trouble so often developing from hammer blows of the trolley. Flexible construction that cushions the blow from the trolley lengthens wire life, prevents arcing, and saves money.

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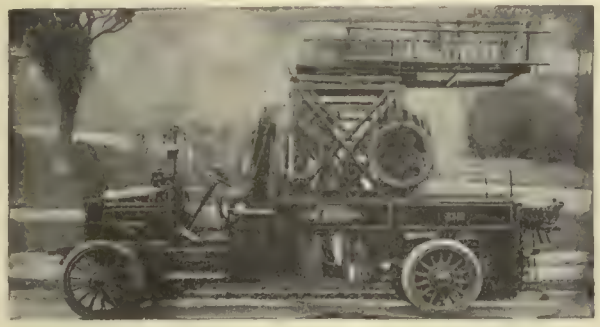
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They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

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This 3-Section

TRENTON TOWER

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The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

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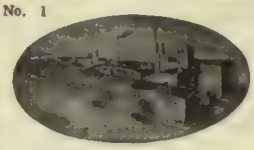
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RECLAIMING MACHINES } for recovering
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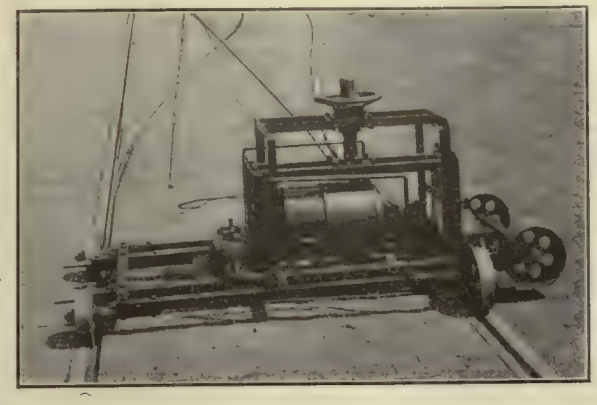

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for single track block signal protection
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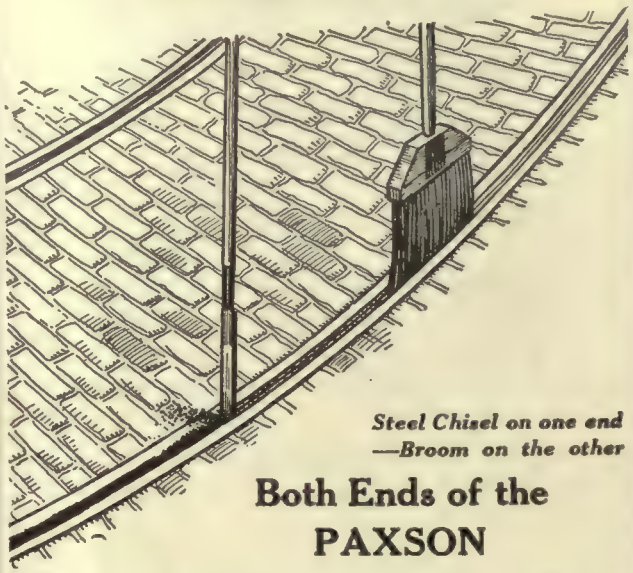
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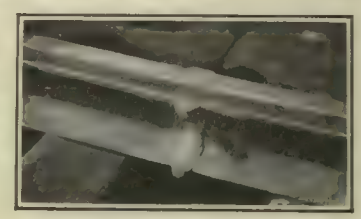
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Scientifically and accurately compounded to reduce lubricating costs.

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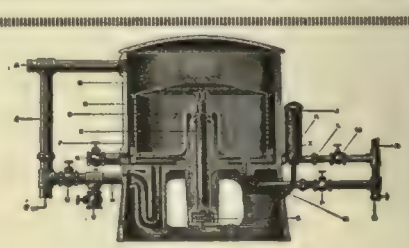
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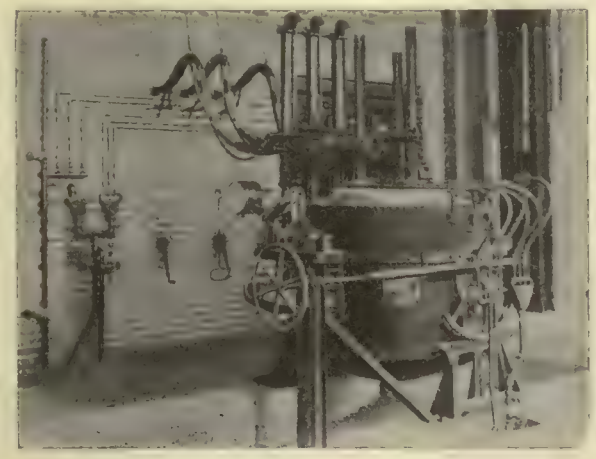
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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

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The 'Lectromelt Furnace will melt a charge consisting of cheap scrap and enable you to make all your steel and grey iron castings at less cost, when and as they are needed.

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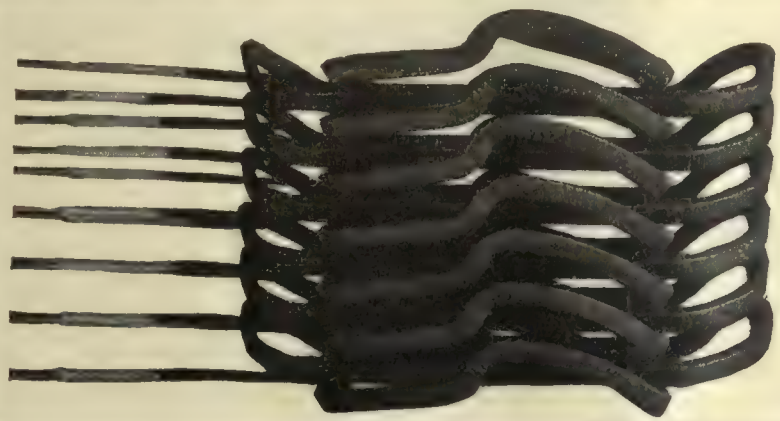
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Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

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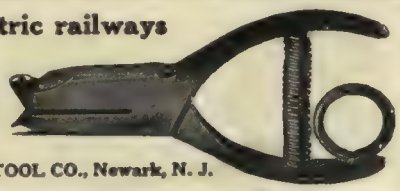
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High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

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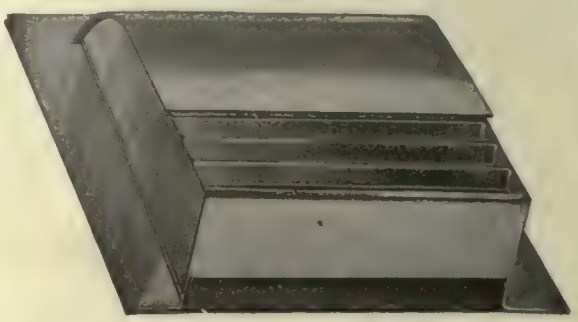
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Exclusive selling agents for HEEREN ENAMEL BADGES.

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have no bolts, nuts or screws, that can be removed from the outside. Let us tell you of other good features.

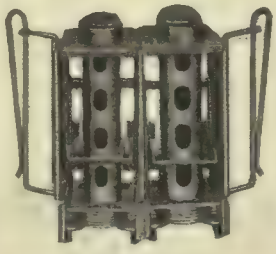
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JOHNSON Universal Changer



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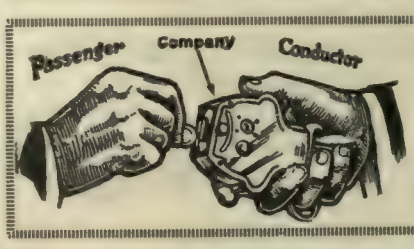
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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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Direct Automatic Registration
By the
Passengers

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GOLD CAR HEATING & LIGHTING CO.
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Bearings make fifty thousand or more miles

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Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
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RATTAN SUPPLIES OF EVERY DESCRIPTION



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E. R. J.

POSITIONS VACANT

DRAFTSMEN, experienced steam and street railway, special track work draftsmen and calculators; advise experience and salary in first letter. P-546, Elec. Railway Journal, Old Colony Bldg., Chicago, Ill.

EXECUTIVE wanted as general manager of interurban street railway operating fifteen cars. State when available; give full references and salary expected in first reply. Address P-552, Electric Railway Journal, 10th Ave. at 36th St., New York.

WORKING shop foreman wanted, familiar with brakes, car wiring and controllers. State age, experience, references and salary expected in first letter. P-554, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ACCOUNTING executive, thoroughly experienced in all branches of large properties: street railway, light, power and gas utility, open for engagement. Capable of assuming full control of all accounting work. PW-543, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

CIVIL engineer, technical graduate; Assoc. M. Am. Soc. C. E.; eighteen years' experience design and supervision of construction, steel and reinforced concrete bridges, buildings, steam and electric railroads, municipal works; five years with one of the biggest electric railroads in this country as engineer of bridges and buildings. PW-551, Electric Railway Journal, 10th Ave. at 36th St., New York.

DRAFTSMAN, reliable young married man, mechanical and electrical experience with steam and electric road, wishes position with progressive company; any location considered. PW-553, Electric Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT railway department, competent to take full charge; twenty years' experience in the electric railway field and hydro-electric operations. PW-555, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

FOR SALE

Porcelain Insulators

2,000 22,000-v., 1-in. pin hole

The Northwestern Ohio Ry. & Pr. Co.
Oak Harbor, Ohio.

TO HELP YOU

SELL USED EQUIPMENT

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G-2

REPRESENTATION AVAILABLE

SUPERINTENDENT of transportation with a proven successful record of 18 years on large city, suburban and interurban properties, at present employed, desires a change and will consider any property that needs a practical, progressive, efficient transportation man who is capable of taking over all details of transportation and handling same in a manner that will get results and be a credit to any property. Present relations are pleasant. Personal reasons for desiring a change. High grade references as to character and ability. Would prefer city and suburban property. Address with details PW-544, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

Notice to Manufacturers of and Dealers in Radio Receiving Apparatus, Electrical Marine Equipment, Electrical Railway Equipment, and Other Electrical and Steam Machinery

TAKE NOTICE that on Thursday, the 24th day of May, 1923, at 2 o'clock in the afternoon, at the plant of the Horne Manufacturing Company, 243 Mercer Street, Jersey City, New Jersey, the undersigned, receiver of said Company, will offer for sale all of the assets of the said Company under order of the United States District Court for the District of New Jersey.

The entire assets of the corporation will first be offered in one lot, in bulk. Thereafter, said assets will be offered in lots as follows:

(1) Radio apparatus, consisting of receiving sets, finished and partly finished, and unassembled parts, finished and partly finished, tubing, aluminum and brass pieces.

(2) Electrical marine interior equipment for ships, consisting of watertight electrical fixtures, mechanical telegraph fittings and voice tube fittings, finished and partly finished.

(3) Electrical railway fittings, consisting of handbrakes, partly finished, and trolley bases, partly finished.

(4) Machinery, motors and necessary shafting, belting and other power transmission appliances.

(5) Fixtures and raw material not apportioned, consisting of brass rod, steel rod, tubing, boards, work-benches, small tools, bins, and office fixtures.

(6) Accounts receivable, together with good will, trade marks, patents and patent rights, electrotypes and catalogues.

Bidders will be required to deposit with the receiver at the time of bid, ten per cent in cash or certified check. The balance is to be paid within five days after confirmation of the sale by the United States District Court.

Purchasers will be required to remove articles purchased before June 5, 1923.

All bids and offers are subject to confirmation by the Court, to which such bids will be submitted for approval on May 28, 1923, at 10:30 A. M., Post Office Building, Trenton, New Jersey.

Dated May 7th, 1923.

JAMES A. HAMILL,
Receiver of Horne Manufacturing Company.

100 lb. Steel Rails

with angle bars

FIRST CLASS RELAYERS

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531 Peoples Gas Bldg., Chicago
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Pittsburgh, Pa.

Other Offices at: New York, St. Louis, Detroit, San Francisco

We carry in stock rails from 50 to 90 per yard.

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1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

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Urbana, Ill.

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10 DOUBLE END EQUIPMENTS

HL Control arranged for operating four WHS 306 motors

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

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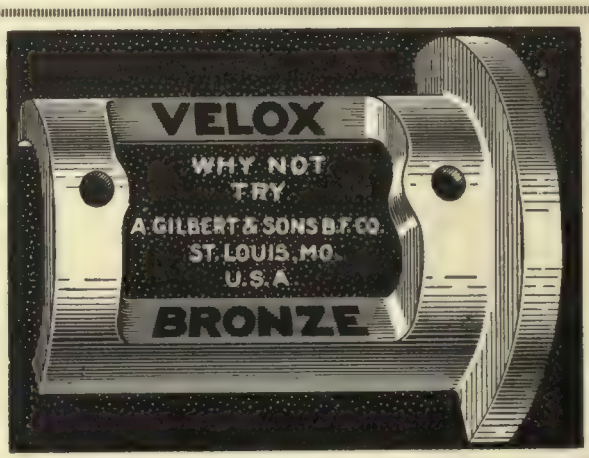
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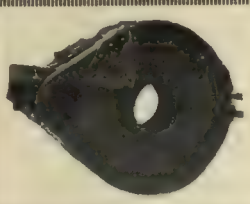
have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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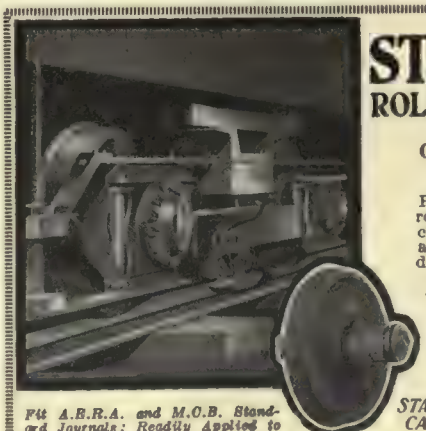
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LAWTON, MICH. U.S.A.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Circuit Breakers
Roller-Smith Co.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Ammeters
Roller-Smith Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Drew Elec. & Mfg. Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Armature Coil Equip. Co.
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Babbitt Metal
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Sup. Co.
Int. Register Co., The
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
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Gilbert & Sons B. F. Co., A.
Le Grand, Nic
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Burry Railway Supply Co.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bearings, Roller, Ball & Thrust
Norma Co., The
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Sup. Co.
St. Louis Car Co.
Boilers
Babcock & Wilcox Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
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Railway Track-Work Co.
Bonds, Rail
Amer. Steel & Wire Co.
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Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
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Roller-Smith Co.
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McGraw-Hill Book Co.
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Bates Exp. Steel Tr. Co.
Drew Elec. & Mfg. Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Sup. Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
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General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
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American Bridge Co.
Brooms, Brushes, Etc.
Worcester Brush & Scraper Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bus Seats
Hale & Kilburn Corp.
Heywood-Wakefield Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Cables, (See Wires and Cables)
Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes, Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
Car Lighting Fixtures
Elec. Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heati'g Co.
Cars, Passinger, Freight, Express, etc.
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Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
General Electric Co.
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Columbia M. W. & M. I. Co.
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American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Le Grand, Nic
St. Louis Car Co.
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Eclipse Ry. Supply Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Change Carriers
Cleveland Fare Box Co.
Circuit-Breakers
General Electric Co.
Roller-Smith Co.
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Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.
St. Louis Car Co.
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Coal ad Ash Handling (See Conveying and Hoisting Machinery)
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Elec. Service Sup. Co.
Coils, Armature and Field
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Elliott-Thompson Elec. Co.
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Westinghouse E. & M. Co.
Coils, Choke and Kicking
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General Electric Co.
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Johnson Fare Box Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
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General Electric Co.
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General Electric Co.
Mica Insulator Co.
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General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
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Ohio Brass Co.
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General Electric Co.
Westinghouse E. & M. Co.
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Westinghouse E. & M. Co.
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General Electric Co.
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Internat'l Register Co., The
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Cord Connectors and Couplers
Elec. Service Sup. Co.
Samson Cordage Works
Wood Co., Chas. N.
Cord, Trolley
Trolley Supply Co.
Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
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Allis-Chalmers Mfg. Co.
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Crossing Foundations
International Steel Tie Co.
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
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Byllesby & Co., H. M.
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Columbia M. W. & M. I. Co.
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Tie Tampers and Car

Pneumatic Methods Reduce Costs

A pneumatic tie tamping outfit makes possible the use of labor saving methods for other work besides tamping ballast under the ties.

For instance, as shown above, the tamping tools have been fitted with cutting tools and used for breaking up the concrete base before making repairs to the track. Other air tools such as Paving Breakers, Track Drills, Grinders, etc. are also used with the outfit.

Ask for literature describing the many uses of Tie Tamper Outfits in track work.

Ingersoll-Rand Company
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191-TT

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Electric Service Sup. Co.
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Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse E. & M. Co.
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Drew Elec. & Mfg. Co.
Electric Ry. Equipmt. Co.
Electric Service Sup. Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Insulators, Combination Strain
American Porcelain Co.
Insulator Pins
Drew Elec. & Mfg. Co.
Elec. Service Sup. Co.
Hubbard & Co.
Insulators, High Voltage
Lapp Insulator Co., Inc.
Insurance, Fire
Marsh & McLennan
Jacks (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.
Elec. Service Sup. Co.
Joints, Rail
(See Rail Joints)
Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.
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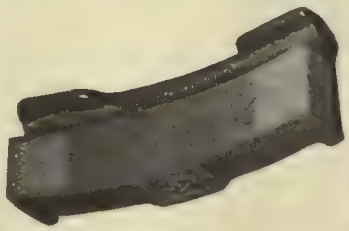
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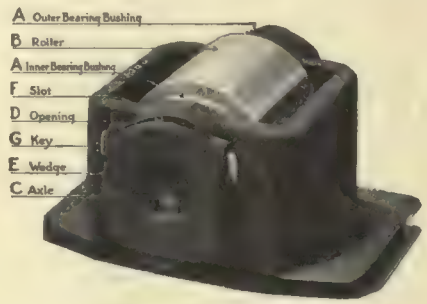
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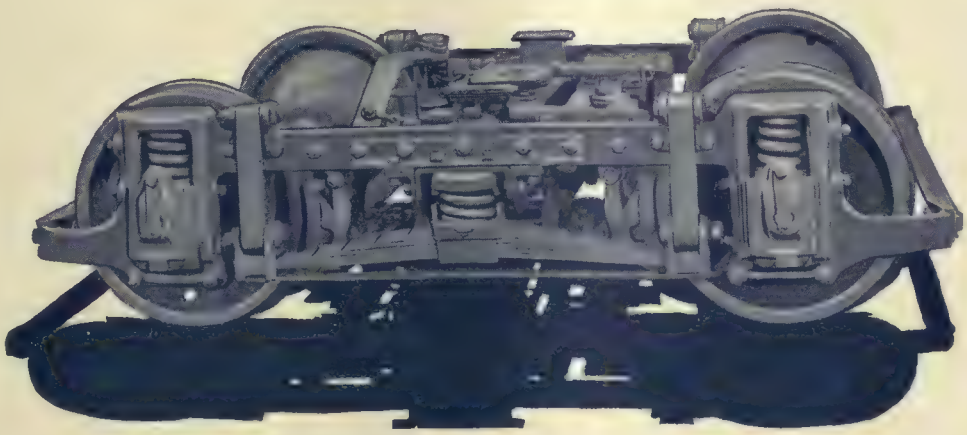
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High Speed, Light Weight and Comfortable Riding Characteristic of Brill 77-E Low-level Type

With new Swing Link Construction

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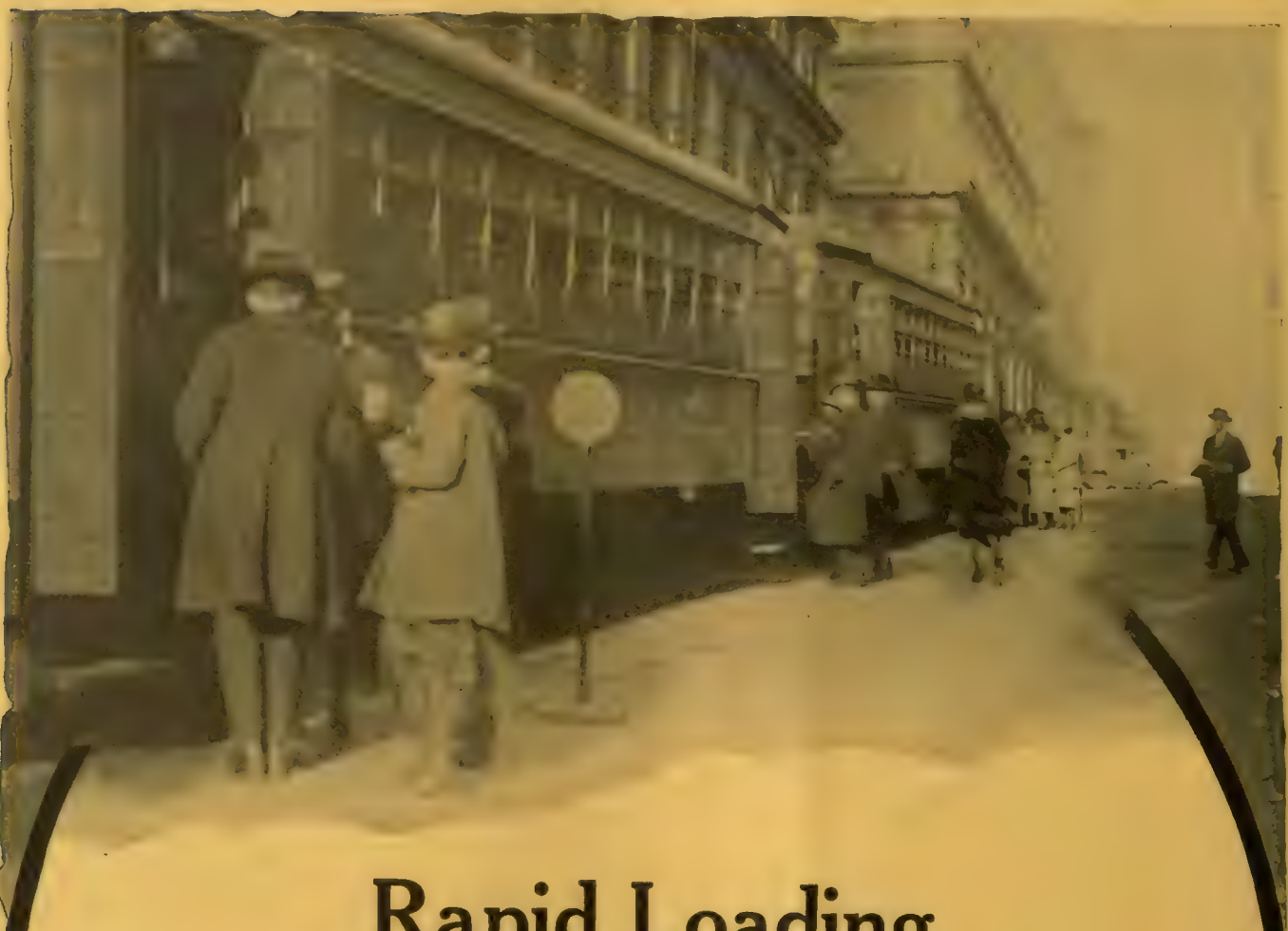
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Standard for Electric Railways

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Better Intelligence, Better Service, Better Success

THE most important word in the business world today is *service*. No individual nor organization can be a success unless service is rendered. The greater the service the greater the success.

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The success of the industry served by the ELECTRIC RAILWAY JOURNAL depends wholly on the quality of service rendered the public. That quality of service which means success is not possible unless each employee—humblest to highest—does the best work of which he is capable.

"How to render greater service to the industry?" was the question we asked ourselves a few months ago. The answer was the "Monthly Maintenance Issue."

Maintenance is one of the great problems of the electric railway. It was decided that the third issue of each month be devoted almost exclusively to helpful, instructive, interesting material of special service to the maintenance men. By rendering greater service to the maintenance men greater service could be rendered the entire industry, and the industry could give better service to the public.

The Monthly Maintenance Issue is sold separately. All alert managers will order and distribute this one issue at least, for they realize that greater success is the result of greater service and that greater service can be secured by placing in the hands of the employees for whom it is intended the maintenance data and information that will enable them to do better work. The manager's opportunities are not being fully used until he sees to it that the Monthly Maintenance Issue reaches *all* his car, line, track and power maintenance supervisors. See last week's issue for the last sample of the M. M. I.



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Type AW-8 Arc Weld Bond for ball of rail application. Terminals provide for a long welding surface and wide angle scarf.

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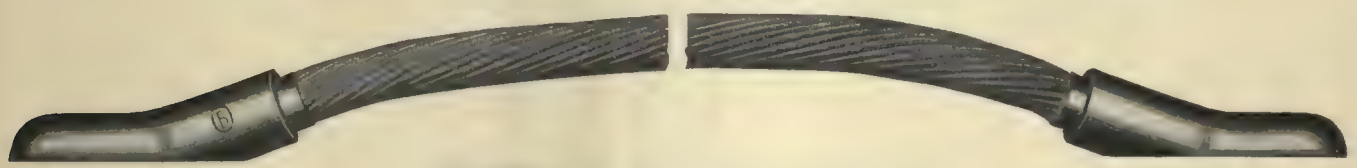
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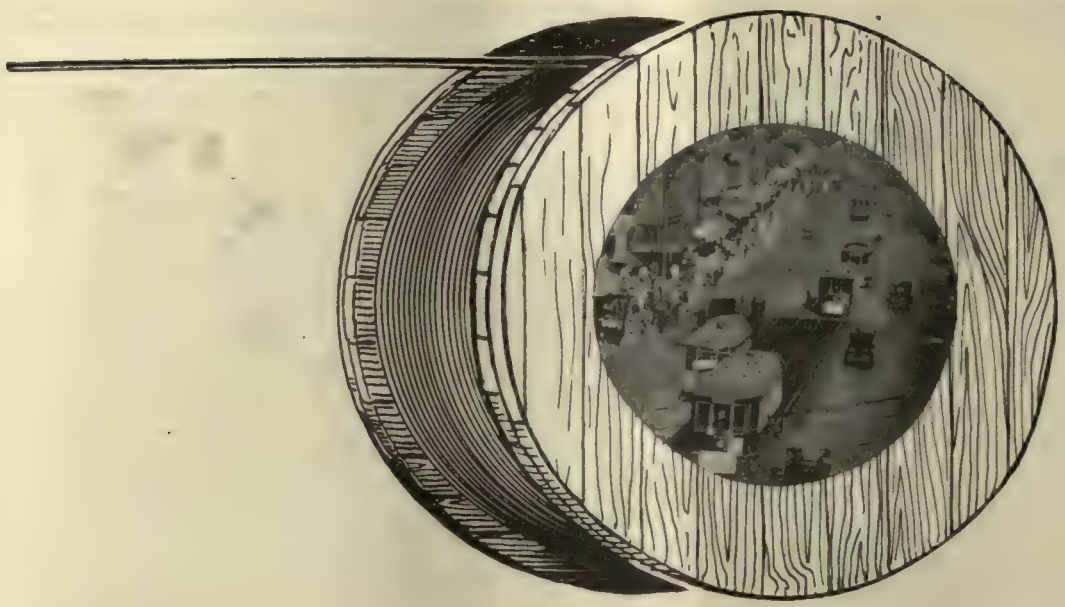
Type AW-7 Arc Weld Bond for base of rail application. Like the AW-8, this bond has a long welding surface and welding scarf of more than 90 degrees. Welding is easy with the AW bonds.

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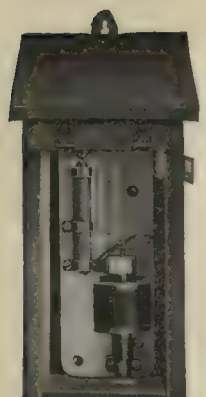
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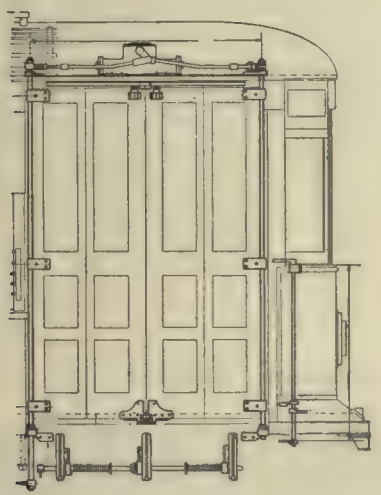
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Door and Step Operating Mechanism
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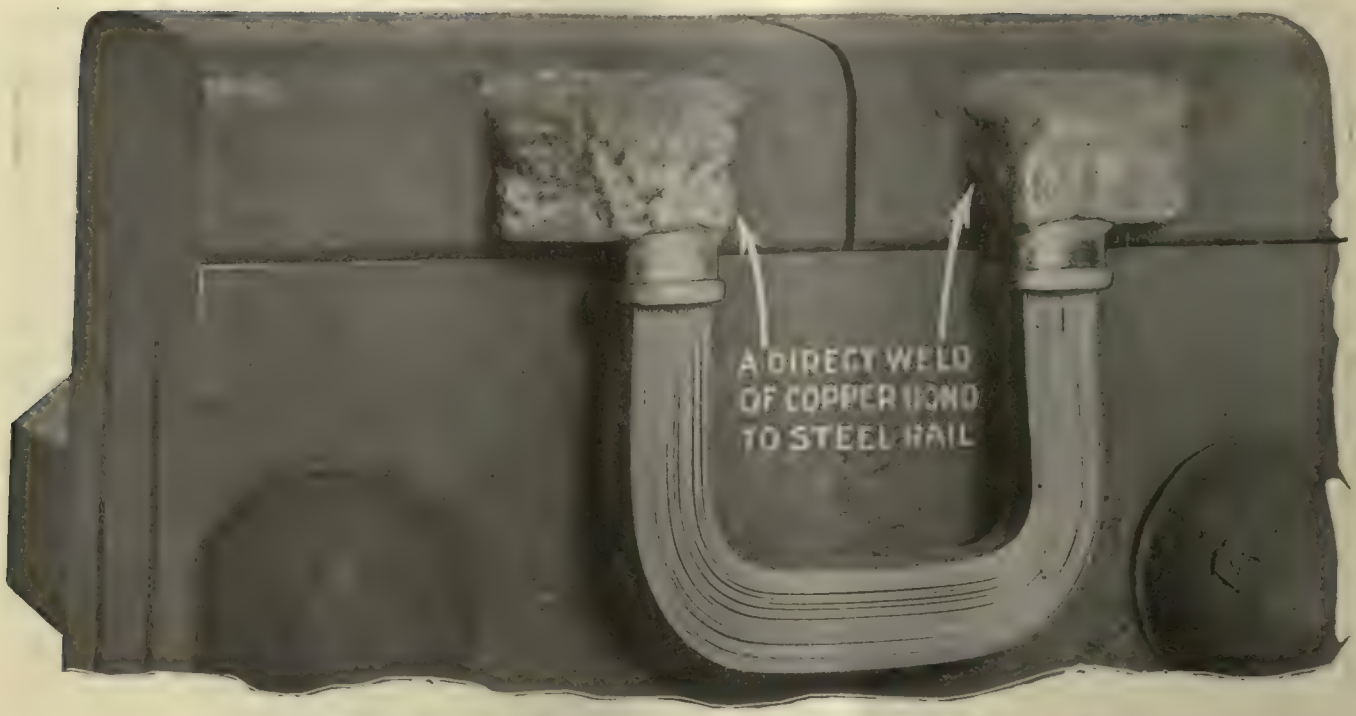
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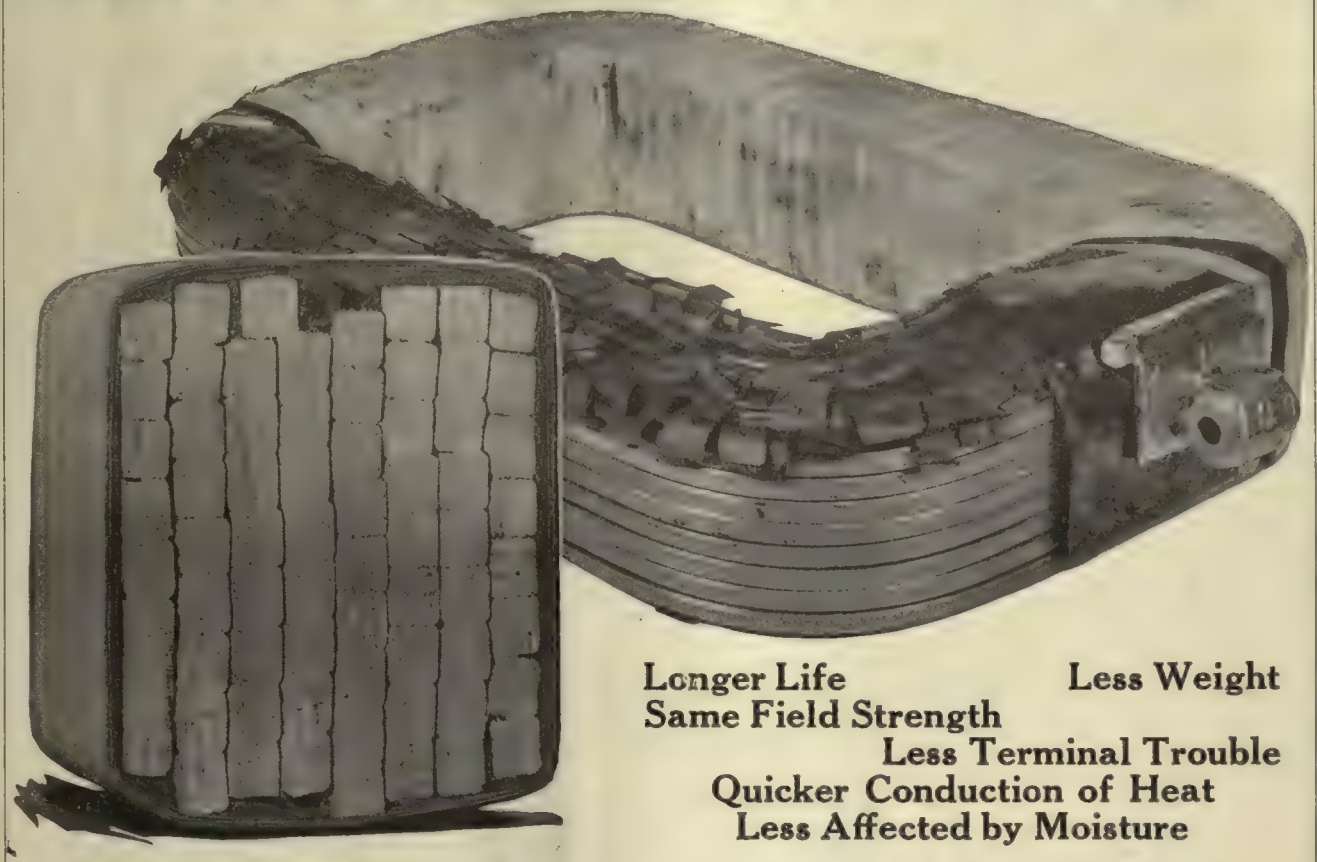
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The Lessons of Experience in Developing Good Public Relations

THE ignorance of the true situation with respect to the utilities as manifested in Congress and the state legislatures on the part of those dependable men not numbered among the radical and socialistic elements only emphasizes the fact that the task of getting the people informed has by no means been accomplished. The work must go on, its importance during the present year being particularly great, as there is a persistent outcropping of socialistic and anti-state regulation agitation here and there.

In pursuing this work further, the industry may well be guided by the experience thus far, from which it is possible to draw these general conclusions.

The plan to greatly enlarge the number of local stockholders is good, but it cannot be relied upon to afford any security at an election. The stockholders need to be educated just as much as the general public. The California campaign for socialization of the water powers proved this.

Too much reliance should not be placed in having lawyers appear before legislative committees to explain what proposed legislation would mean to the utility. The personal appearance of the practical operating executive, the responsible head of the utility, to answer questions and present facts is much more convincing and effective than the efforts of the attorney paid to represent the utility.

Man to man talks should be had with local legislators and congressmen, preferably while they are back home and off duty, about the problems of the public service companies. Or if the railway executive is not personally acquainted with the man who should be truly informed, then he should get a friend who has confidence in him, and who holds the friendship and confidence of the public official whose ear is sought, to put the railway story before the official—the story of facts.

Some definite interest should be taken and time devoted toward raising the caliber of personnel of the legislatures. The need for this is evident in almost all political bodies.

The vote of the men in overalls counts very heavily. Therefore enlist the support and influence of the utility employees and the employees of manufacturers whose prosperity and welfare are tied up with those of the railway.

Reliance on the national railway association for compilations of data is good, but success in any situation depends on how thoroughly the work of education is carried on locally by the local men. The absent treatment won't do. The work of publicity committees and the use of newspaper space have their place, but the railway men must themselves take the stump in dealing with unsound agitations important to their business.

If state regulation is in jeopardy and the backward step to municipal control seems inevitable in any local situation, a compromise providing for state regulation of valuation, rate of return and rate of fare, with municipal control of service, extensions, cars, etc., may partially save the day. Such a law is now working out well in Minnesota.

Political Aspects in Chicago Quite Different

"I AM for the lowest possible fare consistent with good service and good wages. People who are talking about a 3-cent fare or a 4-cent fare are not speaking advisedly. The future will determine what a just fare is, just to the public and just to the companies. The people demand service and they should have it, and I will not favor any reduction in service for the purpose of getting a lower fare."

That, surprisingly enough, from Chicago's Mayor. What a pleasant relief it is to hear from the chief executive of a large city such an expression of view, based on business sense rather than political adventure. It is also reassuring to reflect on the fact that the people of Chicago finally saw through Mayor Thompson's endless and groundless attacks on the street railway, ostensibly in behalf of the people, but really to create political sentiment, and voted overwhelmingly to rid the City Hall of such tactics. This gives hope for the situation in New York and other cities suffering from mayors afflicted with the anti-traction mania. The turn of the mayoralty in Chicago puts a very much more promising outlook on the prospects for working out a satisfactory agreement when the franchises expire in 1927, or, more likely, an agreement in advance of that. This is a matter of such tremendous importance to Chicagoans that it calls for the most complete and intelligent co-operation. Hence the riddance of sham hostility at just this time is of particular significance.

A Semi-Automatic Substation That Controls Its Own Output

PASSENGERS on the New York Central and New Haven Railroads, entering or leaving Grand Central Terminal, New York City, cannot see an unobtrusive new substation which is tucked in under the Park Avenue viaduct near 110th Street. They benefit by its presence, however, for it enables them to get into or away from the city more quickly due to the hundred volts more or less which it adds to the third-rail voltage. Being ignorant of the presence of the substation, they cannot be expected to realize that it is not just another substation, but embodies features of unusual interest.

Its outstanding characteristic is what may be termed "non-overloadability." The station of the usual type, whether manual or automatic, goes out of commission when overloaded. There is nothing else for it to do except to injure itself, and then it will go out anyway. A constant-potential rotary-converter substation cannot

safely be left on the line when the line voltage falls materially. With the aid of resistors in the feeders it can be operated with a greater range of line voltage than otherwise, but this expedient, while necessary, results in power loss and is limited in ability to keep power on the line in case of heavy demands. In general, however, the constant-potential quality of rotary converter output is a controlling advantage in its favor; the circumstances on the New York Central are exceptional. This station must not go out when the heavy load comes on; in fact, it is distinctly a peak-load station and does not run at other times. Non-overloadability was secured by using a plain shunt-wound generator, the natural drooping characteristics of which are accentuated by means of an automatic voltage regulator.

The new substation is also attendantless, and it contains practically all of the relays which form the nervous system of the modern automatic substation. As it was designed to come into and go out of service at specified times the usual undervoltage and overload control was omitted. A time device could easily have been arranged to replace the usual control, but as a manual substation is near by it is preferable to have the service of the new substation initiated and stopped by its operator. The schedule can then be easily modified, and as he supervises operation anyway by means of ammeters, the throwing of the "start" and "stop" switches occasionally is a mere incident to him.

The use of the motor-generator set in this case permitted unusually simple a.c. power supply, because, as the substation is fed at 11,000 volts, a voltage not too high for direct supply to the synchronous motor, the usual transformers and auxiliaries could be dispensed with.

The Personal Work of the Executive in Bettering Public Relations

A REAL service is being done the people of St. Louis by Col. A. T. Perkins, manager for the receiver of the United Railways. Several times recently he has appeared at public meetings and discussed frankly the problems of the company. His latest appearance was before a civic association. At the conclusion of the program for the evening he announced his readiness to answer questions. He did answer many, and no attempt was made to hector him.

The audience was frank and the colonel was even more so. He explained the concern of the creditors. He told about the vast amount of work done in upbuilding the property. He frankly said that much still remains to be done, and that in his opinion the sum of $4,000,000 might well be spent on improvement looking toward the future. He told his hearers he favors a new long-term franchise for the company and said that the valuation issue will probably be decided by July 1. He brought out forcefully the effect of taxation upon the fare paid by the car riders. His statement along these lines probably came as a revelation to many of his hearers.

Limitations of space do not permit a recapitulation here of all the questions that were put to Colonel Perkins, but the account of the meeting addressed by him as reported elsewhere in this issue does indicate that his discussion made a very favorable impression. In short, the Colonel's talk was an effort at intimate understanding with his public that has been deferred too long by many other operating managers.

Municipal Railways Show Profit

THOSE who believe in the policy of private ownership for public utilities should not be surprised when a statement is issued showing that one of the municipal railways in this country or Canada is making money. The editors of this paper consider that under American political conditions the policy of private operation of these utilities is better, both politically and economically, than public operation, but it would be foolish for any one to claim that simply because a management is appointed by a mayor or common council rather than by a board of directors it is incompetent. According to the sixteen months report of the Toronto Railway, published in the issue of May 12, that system shows a very comfortable profit; the informal statement recently made public by Mayor Doremus of Detroit indicates a gratifying return for the road owned by that city; and Seattle had an operating ratio of less than 75 per cent in 1922.

As these railways have been in operation municipally for only a short time, it may be that some of the figures may have to be changed slightly. Thus, the Toronto report contains the statement that some of the figures should be considered approximate only, because the exact sums to be paid by the city for the property, for electrical energy and other matters have not yet been fully settled, and in the case of Detroit it is well known that no decision by the arbitration board on the charges to be paid to the city by the Detroit United Railway for the entrance of the interurban cars has yet been rendered. Finally, in the case of Seattle, as explained last week, the apparent net return is somewhat larger than if the property were subject to all the charges of a privately operated concern. The figures involved in all of these indeterminate matters are probably small enough, however, not to change the income from operation from a surplus to a deficit.

The critical time in municipal operation does not come during the first few years after the city has taken over the property. During this time, the conditions for successful operation are at their best. Much of the equipment is new. The question of taking the property over has been so prominently before the public that there is an eager spirit on the part of every citizen to co-operate in making the new city enterprise a success, and even a political city administration would hesitate about making a political appointment to the railway administration. Hence, able men are chosen.

The critical time comes some time later, after the edge of civic zeal in the enterprise has become dulled and the politicians feel that they can begin safely to tamper with the operating efficiency of the property. Then will come requests or demands for this particular appointee, or that special extension of the line or service, or other action which would not be undertaken by a private property because financially unwise. Of course, a management, commission or political administration strong enough to resist this pressure will be able to conduct the property on business principles. But the experience with various kinds of public operation in this country has not been very happy, and it is obvious that those enterprises, like railways, in which such a large percentage of the receipts goes in direct payment of labor, and where so much loss can be occasioned through the construction of unprofitable extensions, are particularly unsuited for political control.

Whether these reasons will prevent further extension of municipal operation is a question of the future.

New York Central Railroad Has Installed in Electrified Zone at New York a 2,000-Kw. Motor-Generator Set to Raise the Potential 100 Volts During Rush Hours — Construction of Building Under Elevated Structure on Park Avenue Near 110th Street Involved Special Structural Problems

Distant-Controlled, Non-Overloadable, Semi-Automatic Substation

ONE of the most interesting recent applications of automatic control and safeguarding of power-transforming apparatus is the new substation of the New York Central Railroad on Park Avenue near 110th Street, New York City.

The substation is located underneath the Park Avenue viaduct, over which operate all the New York Central and New Haven trains entering the Grand Central Terminal. The steel viaduct at this location is supported at the sides on stone walls and in the middle on steel columns on spread concrete foundations, which, in turn, rest on the rock and dirt fill between the stone walls.

The substation is designed to fit between the stone walls and has a width less than the distance between the central columns. In the removal of the fill, as the column foundations would be undermined, it was necessary to provide temporary supports for the steel structure and extend the column foundation to a level below the floor of the substation.



This Substation Is Tucked Away Under the Park Avenue Elevated Structure

The station is designed for two 2,000-kw. synchronous motor-generator sets, of which one is now installed and in operation. The substation generator set functions as in any other station until fully loaded, when it begins automatically to reduce its bus potential in proportion to the exterior load so as to maintain a constant current output. Under maximum swings it raises the local potential at least 100 volts. It will be operated normally without attendants, although an inspector will visit it once a day, and it will be thoroughly cleaned once a week.

The station is started and stopped from the nearest manual substation, that at Mott Haven, 2 miles away. The operator there simply closes a switch to initiate starting of the new unit. This sets in motion the pilot motor on the drum controller of the type standard in General Electric control equipments. Shutting down is a similar operation. Aside from the fact that the operator at Mott Haven has supervisory control the operation is entirely automatic.

In the Mott Haven substation are an indicating ammeter and a curve-drawing ammeter, which show the conditions at 110th Street. There is also a pilot lamp which lights up when the machine in the new substation cuts in on the direct-current circuit. This is done by a contact on the last direct-current circuit breaker which goes in.

The present schedule calls for the starting of the station at 6:30 a.m. and it runs until 10:30 a.m. It is started again at 4:30 p.m. and operates until 6:30 p.m.

A motor-generator set was used at this point rather than a synchronous converter because the fluctuations in voltage are so great that they could not be followed by a synchronous converter, which is fundamentally a constant-voltage machine. The shunt generator, as used here, lends itself admirably to the production of constant current, especially under automatic control. A unique feature in this case is that the control is so arranged that when first started the unit will operate at 150 per cent of full load and hold this until it warms up to a predetermined amount, which usually takes two hours. The control then automatically lowers the current to full-load value, which it can carry continuously.

An incidental advantage of the use of the motor-generator set is that the motor can be connected directly to the 11,000-volt transmission line, thus eliminating transformers and the auxiliaries that go with them. The cushioning action of the transformers was not necessary, desirable as it might be in constant-voltage substations, because the load is controlled automatically from the direct-current side.

In general the layout of the substation is symmetrical about a center line at right angles to the railroad tracks. (See Figs. 1 and 2.) At the west end is the alternating-current switch and busbar section. The station is cut in on two 11,000-volt, three-phase cable loops, either of which may be used in either direction alone in case of cable trouble. That is, either loop may be opened and either side used, as may be seen in the simplified wiring diagram, Fig. 3.

The high-tension equipment is on two levels, the upper level being for the switching and control equipment,

the lower for the main bus and the cable distribution. The high-tension line passes from the cable potheads through disconnects and current transformers to the motor-operated oil switches, all on the upper gallery. Thence the path is to the main bus on the lower level, thence to the gallery, again branching into two circuits, starting and running. In the starting circuit are disconnects, motor-operated oil switches, current transformers, a three-phase starting compensator to lower the voltage to 4,400, and the starting bus. The starting bus is so arranged that the same compensator can be used for starting either unit in the completed station.

In the running circuit there are disconnects, oil switches and current transformers, with potential transformers (two for the three-phase circuit). A house transformer, tapped in on the main bus, provides for the necessary control power and lighting in the station.

The motor-generator set used in this substation is the largest which the General Electric Company has built for a speed as high as 500 r.p.m., the speed of this set. The motor is of standard design for a.c. starting, being provided on the revolving field with brass bars, copper ring segments and a steel reinforcing ring. The field circuit is closed through a discharge resistor during starting. The alternating current generated in the field winding by transformer action, which dies away as synchronous speed is approached, is used to operate a relay which prevents the field circuit from being completed until after the alternating current has disappeared.

The exciter is direct-connected, being mounted on the commutator bearing of the generator.

As suggested earlier, the set is started at reduced voltage through the compensator, which is cut out when the motor reaches synchronous speed. The oil switches are set to trip at 300 amp., so that not more than about 5,700 kva. can be drawn from the line.

As mentioned earlier, the generator is of the shunt type, there being no series-field winding. There is, however, a series-commutating winding on the generator. The plain shunt machine was used here because its drooping characteristic, conduce to automatic control of the output.

A feature of this installation is the high-speed direct-current circuit breaker, shown in one of the illustrations in the foreground in front of the motor-generator set, and shown in another illustration by itself. This is of the JR-4A type, with a capacity of 5,000 amp. at 666 volts.

Some Details of the Control Circuits

In the control circuits the only manual operation is to close the control-power switch (at 110th Street) and the master starting switch (at Mott Haven). Then through the functioning of relays, if the a.c. control voltage is not below 180, an important device known as the control-current contactor closes and completes several circuits, among them the starting circuit of the motor driving the master switch or drum controller (34).* The drum of the master switch then begins to revolve, completing in succession a number of circuits as in all G.E. automatic control equipments.

The control-current contactor also closes a circuit breaker (42) in the magnetizing circuit of the compensator through which reduced voltage is supplied

*Reference numbers after the names of devices correspond to the numbering in Fig. 4, page 877.

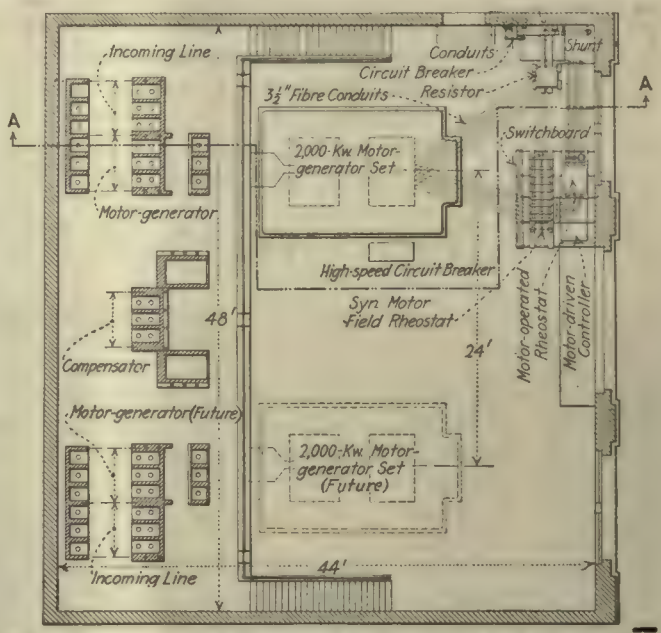


Fig. 1—Plan of Non-Overloadable Substation of New York Central Railroad in New York City

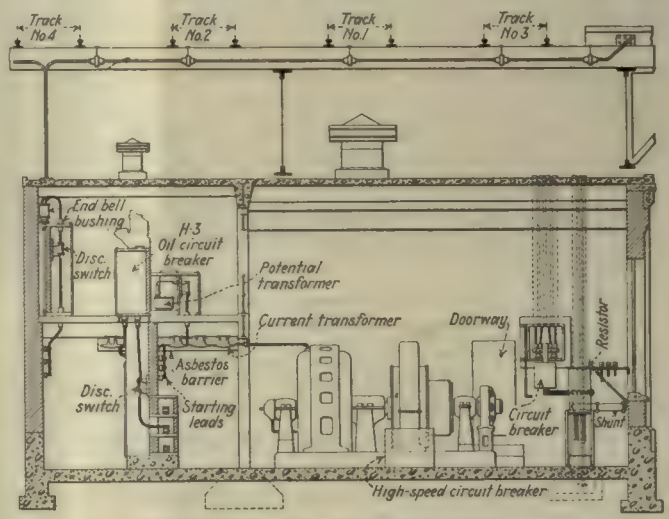


Fig. 2—Vertical Section of the Substation

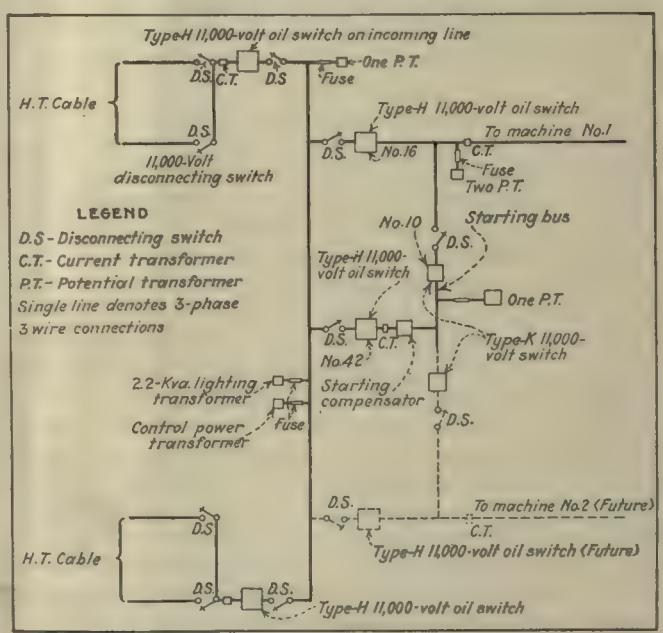
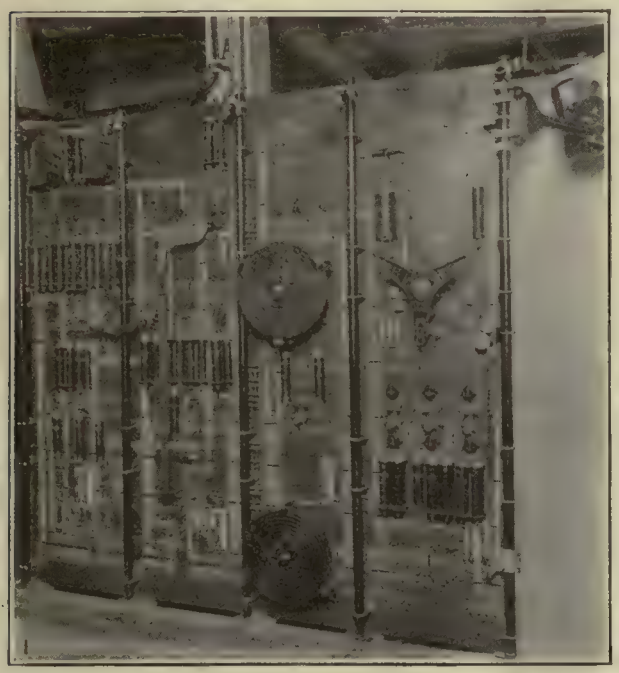
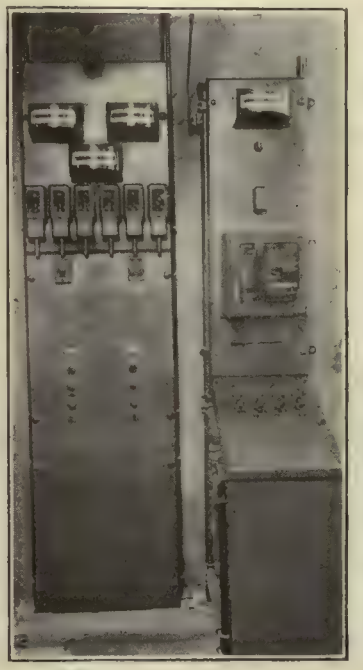


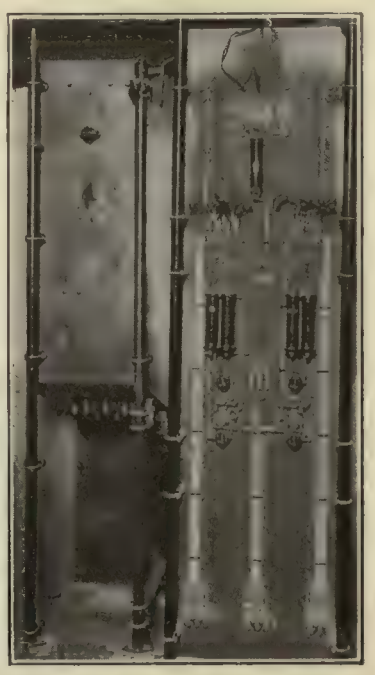
Fig. 3—Single-Line Diagram of 11,000-Volt Circuits in Substation

for starting. This operation energizes the starting bus. An auxiliary switch on the circuit breaker (42) completes the closing-coil circuit of the main motor-starting oil circuit breaker (10), starting the motor.

As the set comes up to speed the exciter voltage builds up and, with the rotation of the master switch and the corresponding operation of relays, a contactor known as the motor-field contactor (41) closes and applies direct current to the field. However, this cannot occur unless synchronous speed has been reached, because there is linked in the field circuit, by means of an auxiliary circuit containing a resistor and the primary of a current transformer, a relay termed the synchronous-speed relay (13), through whose coil flows alternating current induced in the field by the armature which is gradually reduced to zero as synchronous speed is approached. This relay holds out the motor-field contactor until the alternating current dies away, as it does completely at synchronous speed.

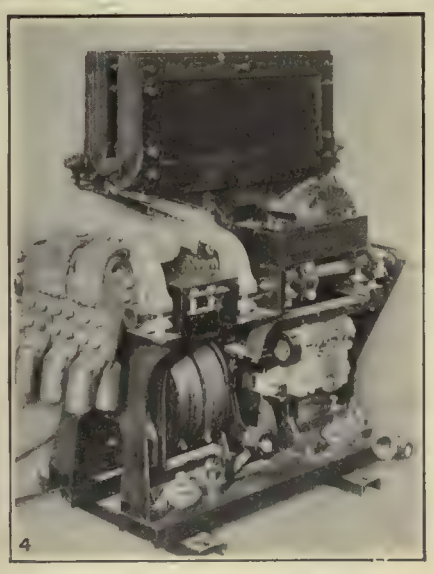


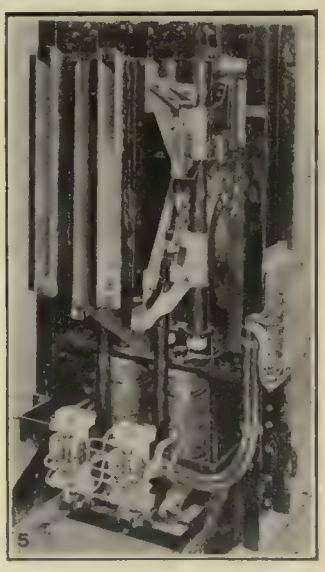




Views of Details of Substation Equipment as Assembled in the Factory

No. 1—Rear view of control and instrument, and motor-operated rheostat panels for motor-generator set.
No. 2—Control panels for two incoming lines, front view.
No. 3—Same, rear view.
No. 4—High-speed direct-current circuit breaker; height about 3 ft.
No. 5—Direct-current control contactors; height about 3 ft. 6 in.





At a given point in the rotation of the master switch the trip-coil circuit of the starting circuit breaker is completed and this circuit breaker opens. Immediately thereafter a circuit is completed through the mechanism of the running circuit breaker (16), which closes and applies full voltage to the motor. Next the compensator circuit breaker is tripped open by the de-energizing of an undervoltage device which forms a part of it. When the running circuit breaker closes it completes a circuit for the contactor (40) for the synchronous-motor-field resistor, which closes and reduces the resistance in the motor field.

As the set is coming up to speed, the d.c. voltage of the generator is building up, and a motor-driven automatic voltage regulator, which is a central feature of the installation, is short-circuited for the time being. If the polarity is right, a polarized relay closes after the machine voltage has sufficiently built up, and when the generator voltage is slightly above that of the bus, a relay, known as the d.c. voltage equalizing relay, closes its contacts and operates the d.c. line contactor (18). This connects the generator and the 666-volt bus through a cushioning resistor.

The master switch now has rotated to such a position as to stop its motor and it so remains, the station being in full operation. At the same time the short circuit on the voltage regulator is removed and voltage control is taken over by what is known as the d.c. load regulating relay (57). In case the current tends to rise above the setting of this relay its contacts open, bringing the regulator into action and causing the current to be held at a predetermined value.

The manual shutting down of the station by the Mott Haven operator is initiated by his closing a "stop" switch. This energizes a stopping contactor at 110th Street, de-energizing the a.c. undervoltage relay and

dropping out the control-current contactor. This starts the master switch, which, by its rotation, opens the running circuit breaker, the d.c. line contactor and the machine resistor short-circuiting contactor. The master switch then stops and all devices assume the "off" position.

APPARATUS IS WELL SAFEGUARDED IN THE NEW SUBSTATION

The protective features in the substation cover the safeguarding of the apparatus in case of the following abnormal conditions:

- Single-phase starting.
- Alternating-current under-voltage.
- Field failure.
- Wrong polarity.
- Reverse power.
- Overheated motor winding.
- Hot bearings.
- Alternating-current overload.
- Overspeed.
- Direct-current overload.
- Overheated resistors.
- Overheated starting compensator.
- Overheated generator winding.
- Under-voltage connection to the direct-current bus.

Told in very brief fashion, the operation of these several protective features in the order given above is as follows:

Single-phase starting is prevented by a single-phase starting relay (32), which is connected across one phase of the circuit, and the under-voltage relay across another, so that three-phase voltage must be present for starting.

Alternating-current under-voltage starting is provided through the under-voltage relay mentioned above, which is connected across the 220-volt a.c. control bus. When the bus voltage is less than 180, this relay makes contact and opens the circuit of the control-current contactor.

In case of field failure during normal operation, the field relay, which is in series with the motor field, is de-energized and closes its lower contacts. This energizes an auxiliary relay which picks up and opens the coil circuit of the control-current contactor, shutting down the set.

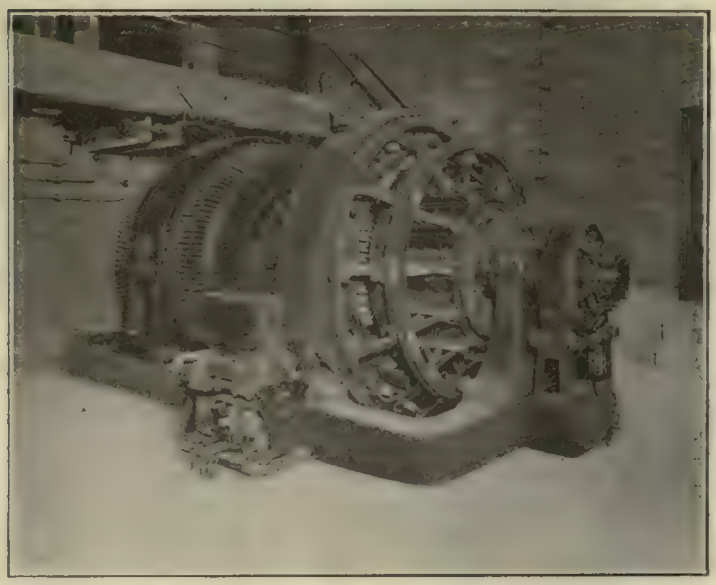
The polarized relay mentioned earlier is provided to prevent operation with wrong polarity. Its coil is connected from the positive terminal of the generator to ground. It must be energized in the proper direction before the d.c. line contactor can close.

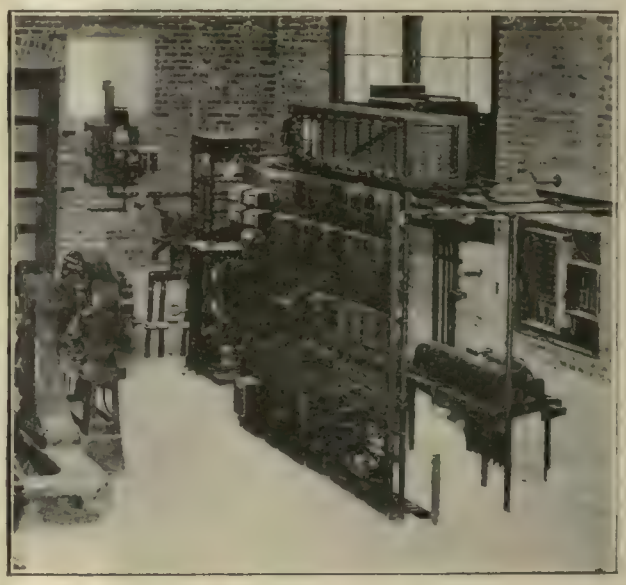
As to reverse power, this is taken care of through a special d.c. reverse-power relay (56). Its contacts close at less than the running-light or no-load current in the reverse direction, exciting the closing coil of an auxiliary relay, which in turn opens the coil circuit of the d.c. line contactor (18), disconnecting the machine from the d.c. bus. The machine is automatically reconnected to the line after a time delay, when the bus voltage drops below that of the machine. For protection against heavy values of reverse current, a d.c. reverse power relay (29) is provided. With current in a normal direction (that is, from the positive terminal of the generator to the bus) the contacts of this relay remain open. On a value of reversed direct current above the setting of the relay, the contacts close, energizing the trip coil of the d.c. line circuit breaker and shutting down the set.

Particular interest attaches in this substation to the way in which overloads are provided for, especially as the substation can be set automatically to take a 50 per cent overload and hold it until the windings are warm enough to require a reduction of load to 100 per cent. For protection against overheated a.c. machine windings, a relay (49) is provided which has temperature-time characteristics similar to those of the motor. A heating element in the relay expands and opens the relay contacts, in turn opening the control-current contactor and bringing the set to rest. When the element has cooled down, the set may be started again. These relays also prevent running too long under heavy loads or badly unbalanced phases.

To prevent overheated bearings a thermal relay of another type functions. This contains a flexible spun-copper bellows connected by a copper tube to a metal cylinder located in a hole at the bottom of the bearing near the babbitt lining. The bulb and bellows are filled with a non-freezing liquid, with a boiling point of 90 deg. C. Overheating of the bearing trips the relay contacts, opening the control-current contactor and shutting down the set. The relay must be reset by hand.

Provision is made for a.c. overload by means of what is termed the a.c.-overload time-delay relay (28), which opens after a predetermined period and shuts down the





At Left—The Quick-Acting Circuit Breaker Is Placed on the Floor Beside the 2,000-Kw. M-G Set.
At Right—The Control Centers in This Corner

station. It must be reset by hand. For an overload produced in starting, another time-delay relay (128) is provided. The opening of the contacts breaks the circuit of the control-current contactor and opens the compensator magnetizing circuit breaker.

If overspeed of the set occurs, a centrifugally-operated switch (12) mounted on the motor end of the shaft closes, tripping out the d.c. line circuit breaker. A switch on this breaker opens the circuit of the control-current contactor, which, of course, shuts down the motor-generator. The circuit-opening contacts also interrupt the coil circuit of the latter contactor on overspeed. The set cannot be restarted until the d.c. line breaker and both sets of contacts of the overspeed limit switch are reset by hand.

An overload on the generator is taken care of by a quick-acting circuit breaker (54), not mentioned earlier, which instantly clears the generator on the negative side. The breaker opens the d.c. line contactor (18) and then recloses immediately. The d.c. line contactor then recloses, as described above.

Overheating of resistors and the starting compensator is prevented by means of thermal relays similar to the bearing-temperature relay.

Particular interest centers in the way in which overheating of the d.c. windings is prevented. Two

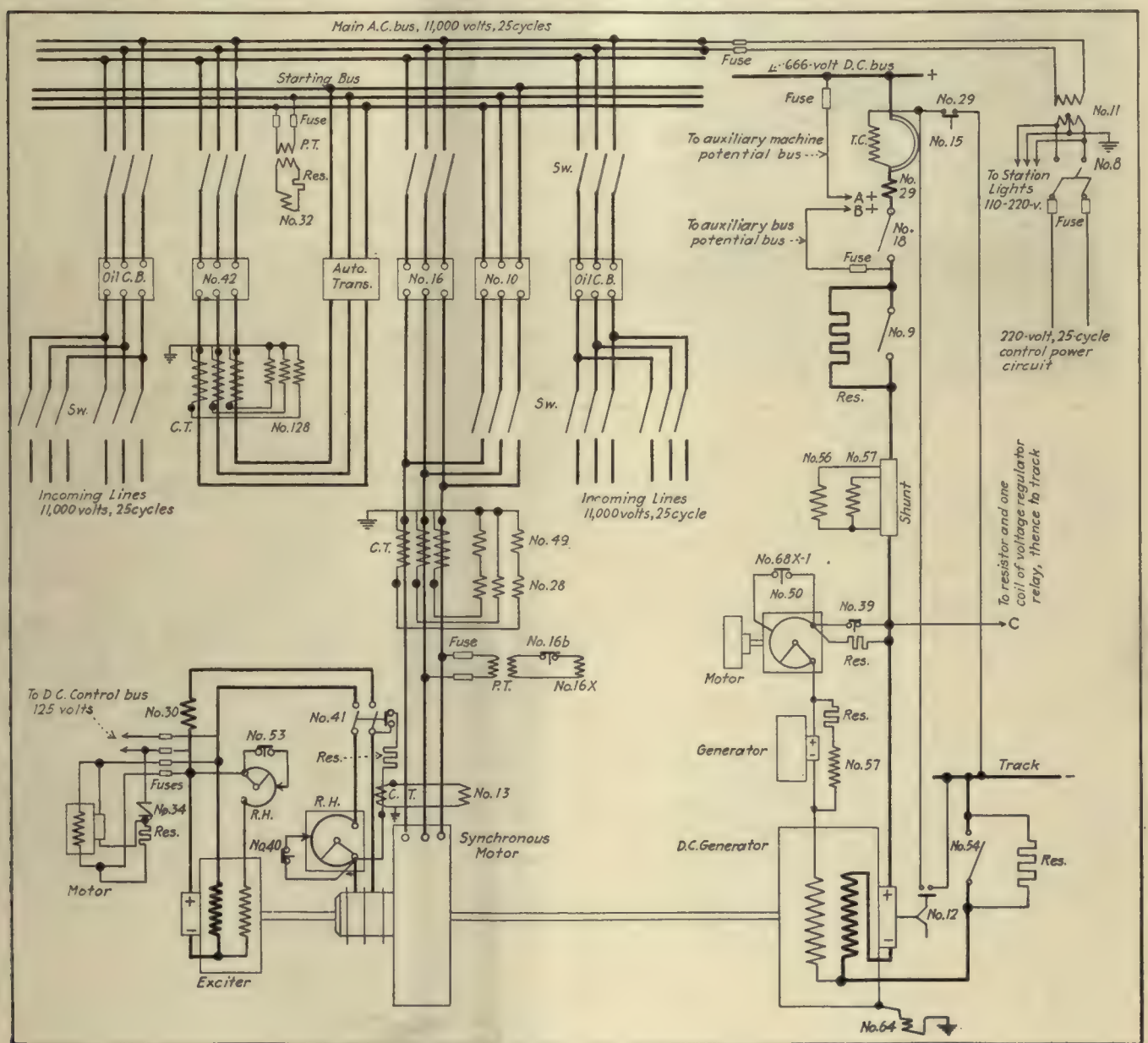


Fig. 4—Diagram of the Power Circuits (Control Circuits Omitted)

8—Control-power switch.
9—Machine-resistor short-circuiting contactor.
10—Starting oil circuit breaker.
11—Control-power transformer.
12—Overspeed limit switch.
13—Synchronous-speed relay.
15—Direct-current-line circuit breaker.
16—Running oil circuit breaker.
16b—Auxiliary switch on No. 16.
16x—Interlocking relay for No. 16.
18—Direct-current-line contactor.
28—Alternating-current-overload time-delay relay, hand reset.
29—Direct-current reverse-power relay.
30—Field relay.
32—Single-phase starting relay.
34—Master switch.
39—Generator field-killing contactor.
40—Synchronous-motor field-resistor contactor.
41—Synchronous-motor field contactor.
42—Compensator-magnetizing oil circuit breaker.
49—Alternating-current-machine temperature relay.
50—Motor-operated field rheostat.
53—Exciter relay.
54—Quick-acting circuit breaker.
56—Direct-current reverse-power and underload relay.
57—Direct-current load-regulating relay, two coils.
64—Direct-current grounding protective relay.
68x-1—One contact of auxiliary relay for direct-current-machine temperature relay.
128—Compensator line time-delay overload relay.

special thermal relays function for this purpose. On moderate overloads the "hot" contacts of one of these close, energizing an auxiliary relay (68x), which cuts in a potential coil of the d.c. load-regulating relay mentioned earlier and causes the load to drop to such an amount that the machine will cool to a safe temperature.

If the overload should still continue the other relay makes its "hot" contact and opens the d.c. line contactor. These relays of course operate in connection with a thermostatic element.



Another View of the Switchboard Corner, with the Field-Boosting Motor-Generator Set in the Foreground

Connection to the d.c. bus at less than the proper voltage is prevented by the d.c. voltage equalizing relay, mentioned earlier. The d.c. line contactor will not close until two contacts of this relay are closed by the voltage of the generator rising slightly above the bus voltage.

The relay functions not only during starting sequences but at any time when the generator is to be reconnected to the bus.

ENGINEERS OF RAILROAD CO-OPERATED IN SUBSTATION WORK

The new equipment was installed under the general direction of the chief engineer of the railroad company, George W. Kittredge. J. W. Pfau, engineer of construction, had charge of the building and foundations; while the heavy shoring and foundations for the overhead viaduct structure were under the direction of Francis Boardman, division engineer. The electrical design and installation were in charge of E. B. Katté, chief engineer of electric traction, and his associates C. B. Martin, transmission engineer; C. P. Ferguson, assistant engineer, and H. W. Walsh, inspector at the site of erection.

Oil Consumption in St. Louis

IN an article entitled "Waste Saturation Plant Halves Oil Consumption, in the April 21, 1923, issue of this paper, page 676, the statement is made that the oil consumption in St. Louis has been reduced from 4,000 to 2,000 gal. per year. The actual reduction was from 4,000 to 2,000 gal. per month. This gives for 1922, the year to which the lower consumption applies and during which the car-mileage was about 43,000,000, a mileage of about 1,800 per gallon.

Passenger Platforms Relieve Confusion in Easton, Pa.

THE center square of Easton, Pa., is popularly known as the "Circle." Eight electric lines of the Easton division of the Lehigh Valley Transit Company enter this circle and leave by the same street, passing entirely around the loop. Formerly passengers boarded these cars at the various corners and thus from four to six stops were made on the loop. To relieve the congestion and confusion of this arrangement a platform has been installed in each of the quadrants of the circle. The cars of two lines stop at each platform, so that but one stop is required in the circle for each car. A conspicuous illuminated sign at the center of each platform gives the names of the lines assigned to it, and each station has a designating number, so that policemen and traffic officers can direct people by telling them the numbers of the stations at which their cars will stop.

The platforms are made in sections 21 ft. long by 8 ft. wide, and they are 5 in. above the street pavement. The flooring of the platform is laid diagonally, as experience has shown that most travel is either longitudinal or crosswise of the platform. With diagonal flooring there is less danger of slipping than when people travel in the direction of the boards. Space is left between the individual boards for drainage and for dirt to fall through. The underframing is of 2-in. x 4-in. and 3-in. x 4-in. timber brush-treated with creosote. The top boards are 1 in. x 4 in. A guard chain with stanchions extends along the outside edge. The stanchions consist of pipe posts with large base castings.

Where lines have both local and limited service, this is designated on the sign. The sign is of white glass with black letters, and lamps are installed inside for illuminating them. The sign is also fitted with a globe and light on top for giving illumination to the platform.



Loading Platform in the Circle, Easton, Pa.

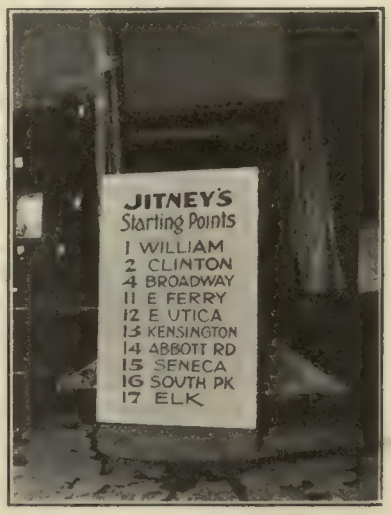
A pipe stanchion supports the sign, and the wiring passes through this to the ground connection. The upright is of 2½-in. pipe and a 3-in. pipe is set in the concrete, so that the upper pipe fits inside of this and is held in place by set screws. The sign and stanchions can thus be readily removed for repairs.

The illustration shows No. 3 platform, at which lines for College Hill, Bethlehem, and Allentown stop.

Bootlegging Jitney Rides in Buffalo



An Amazing Story of How Jitneys Are Being Operated Contrary to the State Transportation Law—They Are Gradually Being Put Out of Business, but It Is Thought that 500 Remain of the 5,000 Which Once Were Operating



These illustrations were taken some time ago when the jitneys were advertising their service. The one at the left shows a jitney displaying its city permit for Route No. 5, which is the Niagara Street route. The illustration to the right shows the former principal down-town terminal for jitneys, with an index of the route numbers displayed by the jitneys and the streets over which they were operating at that time.

ALTHOUGH normal street car service has been restored on the local and interurban lines of the International Railway Company, Buffalo, there are still a number of persons in that city who are in sympathy with the platform employees who have been on strike since July 1, 1922. These sympathizers make the boast that they will never ride on the cars until the men return to work. While every effort is being made by private detectives in the employ of the International to check jitney competition, it is estimated that more than 500 privately-owned automobiles are engaged in the jitney business in Buffalo. These jitneys charge a 10-cent fare and probably collect in fares daily at least $10 each or $5,000 a day in toto.

When the strike of platform employees went into effect on the local and interurban lines of the International almost a year ago, Mayor Frank X. Schwab announced that emergency jitney permits would be issued at the office of the city's chief executive in the City Hall. Thousands of would-be jitney operators stormed the City Hall during the next forty-eight hours seeking permits, and more than 5,000 were granted.

Each person to whom a permit was issued was required to promise that he would operate over a specified route and the fare charged would be not more than 10 cents. A numbered permit was issued to each applicant, and the name and address of each jitney owner was filed with the police department, together with the make of the machine and its carrying capacity. The permit was displayed on the windshield of each jitney, together with a sign giving the route over which the jitney operated.

Within twenty-four hours after there was complete suspension of service on the lines of the International privately-owned jitneys were carrying upward of 750,000 passengers daily and many drivers were boasting that they had a daily income of $40 and $50. Terminals were established at downtown corners by the order of the police department, and Mayor Schwab swore in fifty striking employees as special policemen to act as traffic officers at jitney loading points. Hundreds of other strikers bought automobiles on the partial-payment plan and started to engage in the hauling of passengers for a 10-cent fare. It is said that many strikers took in enough money in the first month of the strike to pay for their cars and operating expenses, and by the end of the summer hundreds of strikers had substantial bank accounts because they found the jitney business profitable

JITNEYS OPERATE IN SPITE OF STATE LAW

When the International Railway began to expand its service with the new employees which it had recruited and to operate cars on various local lines throughout the city, the legal department of the company was confronted with the problem of attempting to rid the streets of the thousands of jitneys. The traction company encountered opposition on every hand, because the chief executive officer of the city largely had control of the situation and he was determined to keep the jitneys in operation.

Application was made to a justice of the Supreme Court for a writ of mandamus directing the Mayor as head of the Department of Public Safety to enforce the law against jitney operation. Counsel for the traction company argued that service was being given on all lines of the company on a normal basis, yet the municipal authorities allowed jitneys to operate without the authority of the Public Service Commission in violation of the transportation law. The writ of mandamus was granted and the Mayor withdrew the emergency permits, but the jitneys continued to operate even on a more extensive scale than before.

The service was not given by buses but by passenger automobiles of various makes and ages. These cars appeared in the streets without jitney license numbers and without route designations, but attempted to get around the law by carrying such signs as, "Going Out Main," "Ride Out Genesee," "We Stop Along Elmwood," "My Home Is on Niagara Street," etc. These signs appeared pasted on the windshields of cars in all parts of the city. The police made no effort to stop this illegal jitney competition.

The legal department of the International found it was facing a very difficult problem, and the entire claims department of the International and many of the officials of the claims department of the Philadelphia Rapid Transit Company were assigned to jitney duty

in Buffalo. Scores of men worked day and night in an effort to put an end to this unfair competition and so successful were their efforts that today fewer than 500 jitneys are in operation and they are making every effort to conceal their identity and avoid arrest.

Finding that the mandamus proceedings directed against the Mayor were of little effect, the International Railway placed checkers at dozens of street corners to get the license numbers of cars suspected of being jitneys. After careful checking it was easy to determine what cars were being operated back and forth along certain streets. Then application was made to the courts for injunctions restraining the car owners from operating their machines as jitneys in violation of the state transportation act. The service of these thousands of injunctions was a big task, but it had a tendency to scare many jitney drivers into ceasing operations.

The work of the secret service department of the International Railway with the aid of operatives from the Philadelphia Rapid Transit Company continued and the checking was renewed. Men were detailed to ride the jitneys and obtain evidence against individual drivers. The men worked in pairs so that the testimony of one would corroborate that of the other. The jitney drivers then grew suspicious when two men attempted to board their car at a given point, so a man and woman detective were paired off and much evidence was obtained in this manner.

Nearly Two Thousand Warrants Were Issued

When the legal department of the International was satisfied that automobile owners were violating the injunction and there was sufficient evidence that they were operating in competition with the local lines of the International on a 10-cent fare, application was made to judges of the Supreme Court for warrants of arrest for contempt of court. Almost 2,000 such warrants were issued. The company found it an exceedingly difficult task to serve these Supreme Court warrants, but when they were served and the jitney owners were taken into custody by International detectives fines of $250 and ten days imprisonment were imposed.

After several heavy fines and penitentiary sentences had been imposed, there was a noticeable drop in the number of jitneys being operated in Buffalo. The campaign is being continued, and now the jitney owners are being arraigned in City Court on charges of operating a bus line without obtaining certificates of convenience and necessity from the Public Service Commission. More than 700 jitney drivers have been arrested and most of them have demanded jury trials, so that at least 500 such cases are now pending in the City Court.

The International has been having some difficulty in prosecuting these cases because the evidence against them was obtained probably months ago and the detectives who were then working on the case have left the city or are no longer in the employ of the railway company. Many jitney owners have been arrested four and five times, apparently willing to pay a fine and consider it part of the cost of operation. In a large number of instances convicted jitney owners have paid their fines with dimes and nickels. In one instance when a jitney driver was found guilty and fined $250, he laughed and offered to pay the fine in small change. The judge was impressed with the large amount of silver being counted so he ordered the jitney driver locked up until the money could be counted. The judge told the clerk to be in no hurry to count the money so the jitney driver was in the lockup thirty-six hours before he was informed that he had given the correct amount of change to pay his $250 fine.

Evidence Is Getting More and More Difficult to Obtain

With the arrest and conviction of so many jitney owners and drivers, it is getting more and more difficult to secure the necessary evidence against suspects. Detectives, however, continue to make attempts to obtain rides and ask the rate of fare. In some instances the jitney drivers say there is no charge for the ride, but "leave your donation on the rear seat." Other jitneys display a small box attached to the driver's seat saying, "Poor Box," "For the Benefit of Strikers," etc.

The jitney owners have been subjected to so much prosecution that they have organized an association. Membership in it provides the driver with an attorney in case he is arrested, and the application of the association for certificates of convenience and necessity from the Public Service Commission was recently rejected.

Many tricks have been tried by the jitney drivers in their attempt to evade the law. One recent attempt was nipped in the bud by the traction company. It provided for the organization of a social society with weekly dues of $1 entitling the members to a weekly pass on any jitney in the city. The court ruled this was merely an attempt on the part of the jitney owners and drivers to evade the law.

It is estimated that fully 70 per cent of all jitney owners and drivers brought into court are convicted. Few of them plead guilty, but figures available in the records of the City Court show that about 5 per cent enter pleas of guilty. The others demand jury trials. In almost every instance where jitney drivers have been taken into custody on warrants charging contempt of court they have been found guilty. Judges of the City Court and Supreme Court justices have been co-operating in an effort to stamp out this illegal competition with the International.

The city law department took an appeal from the writ of mandamus issued during the early days of jitney competition and the contentions of the city were upheld by the higher courts. It was ruled that the Mayor could issue such permits during a strike emergency. The contentions of the International Railway, however, have been upheld in other decisions of the Appellate Division and the New York State Court of Appeals in its efforts to stop unfair jitney competition.

Changes in Cost of Living

ACCORDING to the Bureau of Labor Statistics of the U. S. Department of Labor changes in the total cost of living in various cities throughout the United States from December, 1922, to March, 1923, show variations from a decrease of 2.9 per cent to an increase of 0.8 per cent, the average for the United States being a decrease of 4.4 per cent.

In thirty-two of the leading cities the decrease in cost of living from June, 1920, to March, 1923, averaged 22 per cent. The decrease was greatest in Savannah, Ga., where it was 25.1 per cent, and it was least in Los Angeles, being but 14.3 per cent. For the year from March, 1922, to March, 1923, the changes were all the

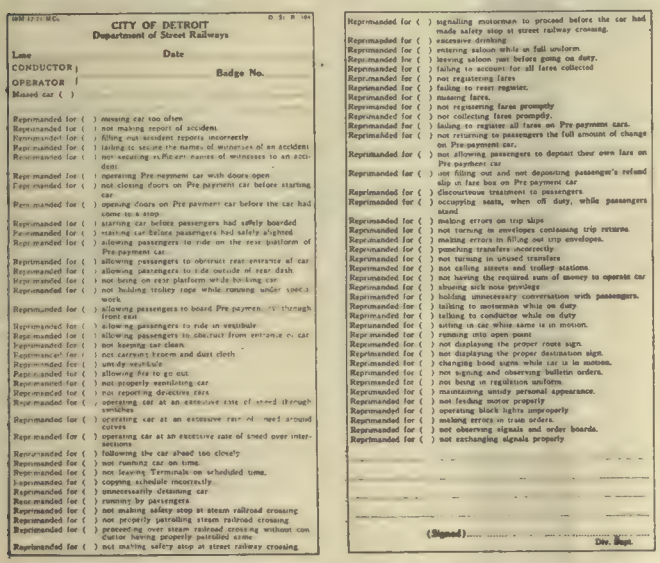
way from an increase of 3.8 per cent in Indianapolis to a decrease of 3.3 per cent in Seattle. For the period from December, 1922, to March, 1923, the range was considerably smaller, the maximum increase being 0.8 per cent in Memphis and the maximum decrease 2.9 per cent in Seattle.

Detroit Trial Board Works Well

All Cases of Dismissal from the Ranks of the Platform Men Come Before Board for Final Decision—Method of Handling Cases Outlined

ON THE Detroit municipal railway no platform employees are discharged until their cases have been considered by a board of three, known as the trial board. The general manager of the company, or, in his absence, the assistant general manager, is chairman of the board. The superintendent of transportation is one of the other members. The third member is some department head, and the effort is made to enlist in this service the heads of the different departments of the company in rotation.

Cases come before the board upon the application of a division superintendent who has authority to suspend the man from service but not to discharge him.



CITY OF DETROIT
Department of Street Railways

Line
Date
CONDUCTOR
OPERATOR
Badge No.
Missed car ( )

Reprimanded for ( ) missing car too often
Reprimanded for ( ) not making report of accident
Reprimanded for ( ) filling out accident reports incorrectly
Reprimanded for ( ) failing to secure the names of witnesses to an accident
Reprimanded for ( ) not securing sufficient names of witnesses to an accident
Reprimanded for ( ) operating Pre-payment car with doors open
Reprimanded for ( ) not closing doors on Pre-payment car before starting car
Reprimanded for ( ) opening doors on Pre-payment car before the car had come to a stop
Reprimanded for ( ) starting car before passengers had safely boarded
Reprimanded for ( ) starting car before passengers had safely alighted
Reprimanded for ( ) allowing passengers to ride on the rear platform of Pre-payment car
Reprimanded for ( ) allowing passengers to obstruct rear entrance of car
Reprimanded for ( ) allowing passengers to ride outside of rear dash
Reprimanded for ( ) not being on rear platform while braking car
Reprimanded for ( ) not holding trolley rope while running under special work
Reprimanded for ( ) allowing passengers to board Pre-payment car through front exit
Reprimanded for ( ) allowing passengers to ride on vestibule
Reprimanded for ( ) allowing passengers to obstruct front entrance of car
Reprimanded for ( ) not keeping car clean
Reprimanded for ( ) not carrying broom and dust cloth
Reprimanded for ( ) unduly vestibule
Reprimanded for ( ) allowing fare to get out
Reprimanded for ( ) not properly ventilating car
Reprimanded for ( ) not reporting defective cars
Reprimanded for ( ) operating car at an excessive rate of speed through switches
Reprimanded for ( ) operating car at an excessive rate of speed around curves
Reprimanded for ( ) operating car at an excessive rate of speed over intersections
Reprimanded for ( ) following the car ahead too closely
Reprimanded for ( ) not running car on time.
Reprimanded for ( ) not leaving Terminals on scheduled time.
Reprimanded for ( ) copying schedule incorrectly
Reprimanded for ( ) unnecessarily detaining car
Reprimanded for ( ) running by passengers
Reprimanded for ( ) not making safety stop at steam railroad crossing
Reprimanded for ( ) not properly patrolling steam railroad crossing
Reprimanded for ( ) proceeding over steam railroad crossing without conductor having properly patrolled same
Reprimanded for ( ) not making safety stop at street railway crossing

Reprimanded for ( ) signalling motorman to proceed before the car had made safety stop at street railway crossing.
Reprimanded for ( ) excessive drinking
Reprimanded for ( ) entering saloon while in full uniform
Reprimanded for ( ) leaving saloon just before going on duty.
Reprimanded for ( ) failing to account for all fares collected
Reprimanded for ( ) not registering fares
Reprimanded for ( ) failing to reset register.
Reprimanded for ( ) missing fares.
Reprimanded for ( ) not registering fares promptly
Reprimanded for ( ) not collecting fares promptly.
Reprimanded for ( ) failing to register all fares on Pre-payment cars.
Reprimanded for ( ) not returning to passengers the full amount of change on Pre-payment car.
Reprimanded for ( ) not allowing passengers to deposit their own fare on Pre-payment car
Reprimanded for ( ) not filling out and not depositing passenger's refund slip in fare box on Pre-payment car
Reprimanded for ( ) discourteous treatment to passengers.
Reprimanded for ( ) occupying seats, when off duty, while passengers stand
Reprimanded for ( ) making errors on trip slips
Reprimanded for ( ) not turning in envelopes containing trip returns.
Reprimanded for ( ) making errors in filling out trip envelopes.
Reprimanded for ( ) punching transfers incorrectly
Reprimanded for ( ) not turning in unused transfers
Reprimanded for ( ) not calling streets and trolley stations
Reprimanded for ( ) not having the required sum of money to operate car
Reprimanded for ( ) abusing sick note privilege
Reprimanded for ( ) holding unnecessary conversation with passengers.
Reprimanded for ( ) talking to motorman while on duty
Reprimanded for ( ) talking to conductor while on duty
Reprimanded for ( ) sitting in car while same is in motion.
Reprimanded for ( ) running into open point
Reprimanded for ( ) not displaying the proper route sign.
Reprimanded for ( ) not displaying the proper destination sign.
Reprimanded for ( ) changing hood signs while car is in motion.
Reprimanded for ( ) not signing and observing bulletin orders.
Reprimanded for ( ) not being in regulation uniform.
Reprimanded for ( ) maintaining untidy personal appearance.
Reprimanded for ( ) not fending motor properly
Reprimanded for ( ) operating block lights improperly
Reprimanded for ( ) making errors in train orders.
Reprimanded for ( ) not observing signals and order boards.
Reprimanded for ( ) not exchanging signals properly

(Signed) .....
Div. Supt.

Front and Back of Sheet Used to List Reprimands of Employees

Promptly after he is suspended the superintendent forwards to the superintendent of transportation a report on a regular form provided. This gives the name of the employee, his residence address, badge number, line, etc., date of the suspension, and detailed information as to the offense for which dismissal is requested.

Notice that the trial board will take up any particular case is sent to the suspended employee so that he can be present in person, and also to the division superintendent so that he can be present or represented. If the suspended employee fails to appear before the trial board without due cause, he is automatically discharged, or if he declares to the division superintendent when being suspended that he does not wish to appear before the trial board, he is required to sign a resignation and this resignation is forwarded to the trial board. When an employee is under suspension, his outfit is not taken up unless he resigns.

The evidence considered by the board consists not only of such verbal or written statements as the division

TABLE SHOWING COMPARATIVE MONTHLY REPORT OF ACTIVITIES FOR JANUARY, 1923, AND FEBRUARY, 1923, OF TRANSPORTATION DIVISION, DEPARTMENT OF STREET RAILWAYS, DETROIT

Revenue car-miles in January	4,285,160.78
Revenue car-miles in February	3,953,915.27
Decrease in February	331,245.51

	Total in January	Total in February	Increase Over January	Decrease Under January
New Service Schedules				
Put into effect	36	28		8
Prepared	38	32		6
Platform Men				
Qualified	392	345		47
Not finishing practice	146	143		3
Dismissed on account of unsatisfactory reference letters	8	8	0	0
Under instruction end of month	210	165		45
Failing to pass doctor	111	63		48
Not reporting to doctor				
Transferred	45	21		24
Operators resigned	71	72	1	
Conductors resigned	63	68	5	
Total resigned	134	140	6	
Operators dismissed by trial board	4	7	3	
Conductors dismissed by trial board	4	7	3	
Total dismissed by trial board	8	14	6	
Grand total left service	142	154	12	
Force at End of Month				
Operators on board	1,906	1,998	92	
Conductors on board	1,808	1,919	111	
Platform employees on board	3,714	3,917	203	
Carhouse and terminal employees	275	281	6	
Division superintendents' supervisory force	43	43	0	0
Main office and miscellaneous employees	50	51	1	
Total force	4,082	4,292	210	
Complaints				
Received at City Hall office either by mail or telephone, re:				
Passing up passengers	21	11		10
Transfers issued improperly	4	7	3	
Service	5	6	1	
Discourtesy of employee	10	4		6
Negligence of employee	10	6		4
Transfer controversies	8	7		1
Dispute over fares	4	4	0	0
Heat and ventilation	0	3	3	
Miscellaneous	10	6		4
Total	74	56		18
Received at Main Office, re:				
Passing up passengers	46	51	5	
Transfers improperly issued	13	12		1
Service	41	25		16
Discourtesy of employee	40	32		8
Negligence of employee	58	55		3
Transfer controversies	22	26	4	
Dispute over fares	11	9		2
Heat and ventilation	4	2		2
Miscellaneous	8	10	2	
Total	243	222		21
Grand total all complaints	317	278		39
Commendations of employees				
Received at City Hall Office	2	0		2
Received at main office	13	9		4
Total	15	9		6
Suggestions				
Received at City Hall office	7	1		6
Received at main office	38	29		9
Total	45	30		15
Lost articles				
Received	1,453	1,264		89
Claimed at carhouses	128	114		14
Claimed at lost article department	328	245		83
Total claimed	456	359		97
Returned to finder	1,052	943		109
Money at Lost Article Department				
Received	$832.44	$494.90		$337.54
Claimed at carhouses	136.15	267.91	131.76	
Claimed at lost article department	608.67	146.91		461.76
Total claimed	744.82	414.82		330.00
Returned to finder	180.18	95.44		84.74
Notification postal cards sent out	163	134		29
Calls (in person or by phone) At City Hall Office				
In person	1,772	1,040		732
By phone	573	454		119
Total	2,345	1,494		851
At Lost Article Department				
In person	351	338		13
By phone	613	515		98
Total	964	853		111
Total at both downtown offices				
In person	2,123	1,378		745
By phone	1,186	969		217
Grand total, all calls at downtown offices	3,309	2,347		962
Maps sold by City Hall office	1,005	700		305
Passenger stops established	16	4		14
Passenger stops discontinued	7	7	0	0

superintendent and employee wish to make, but also all documents relating to the complaint, accident, or whatever the reason for the hearing by the board, and all papers relating to the past performance of the employee. This file is collected and submitted to the board by the chief of the intelligence bureau.

After the board has taken action on the case a bulletin is issued and posted in all carhouses stating the charges which were made and the action taken by the board in each case. A copy of this bulletin is also filed with the record of each employee whose case was brought before the trial board.

If an employee is reinstated after being suspended, his seniority and rating continue, the board deciding whether he shall be paid for full time or part time during the period of suspension. Employees who have resigned under the conditions of suspension already mentioned, or who have been discharged by the board, are not re-employed unless the case comes again before the board and authority for re-employment is given. The ex-employee must also make written request to have the board authorize his re-employment if he wishes again to work on the system.

A blank found convenient for keeping records of reprimand and forming part of the employee's record, already mentioned, is reproduced.

All complaints sent in relating to employees are investigated personally before they go definitely against a man's record. Each month a table is made up giving a list of the number of the different kinds of complaints, as well as of commendations and suggestions received from the public, and this table forms a part of the records of the transportation division, with other data called its "comparative monthly report of activities." The monthly report of this kind for January and February, 1923, is published in the accompanying table.

Cleveland and Interurbans Agree

The Latest Form of Contract for Interurban Cars Entering the City Over the City Tracks Is Published in Full

THERE is so much interest in the subject of contracts between interurban and city roads by which interurban cars enter the city over the city tracks that the form of contract recently adopted by the Cleveland Railway for passenger cars is presented in full. This particular contract was made with the Northern Ohio Traction & Light Company, which operates the line from Cleveland to Akron and was signed last December, but there are similar contracts between the Cleveland Railway and the other interurbans entering Cleveland.

These contracts replace those made about twenty-five years ago. Most of these were for twenty-five years and have expired or are expiring. Under this former contract the Cleveland Railway took all of the fares for the city rides, paid all of the expenses and recompensed the interurban railway at the rate of 2 cents per car-mile for the use of its cars. The only expense assumed by the interurban railway was that of ordinary car maintenance. The new contract follows:

This Agreement, made and entered into this first day of December, 1922, by and between the Cleveland Railway, party of the first part, and the Northern Ohio Traction & Light Company, party of the second part, both being electric railway corporations organized and existing under and by virtue of the laws of the state of Ohio, witnesses that:

Whereas it is the mutual desire of the parties hereto that the party of the first part operate all cars owned by the party of the second part between the point of physical connection of the tracks of the two parties and any point on the lines of the party of the first part which may be the destination of such cars and whereas the operation of freight, express, work and other cars on the lines of the party of the first part are subject to and governed by other agreements, franchises and rules, this agreement is limited to and affects only the operation of passenger cars;

Now, therefore, the parties hereto have agreed, and do hereby agree, as follows:

ARTICLE I

The party of the first part agrees:

1. To accept all scheduled, extra or special passenger cars in good condition tendered it by the party of the second part at or near a point about 4,210 ft. southerly from the intersection of Miles Avenue and Broadway on the private right of way of both companies in front of the Calvary Cemetery (the point of physical connection of the tracks of the parties hereto), and to operate them over such routes and to such points as may be agreed upon by the parties hereto or fixed by the Council of the city of Cleveland, and to return cars to the party of the second part in like good operating condition, necessary wear and tear excepted.

2. To charge, collect and retain all fares from and to the points herein named as provided in ordinance of the city of Cleveland, File No. 53779, adopted Dec. 13, 1920.

3. To assume and pay all expenses of operation of cars from and to the points of physical connection.

4. To credit party of the second part with all fares received by it and to account for same monthly.

5. To render, monthly, invoices for all mileage operated under this agreement at the rate of 35 cents per car-mile, less credits made as provided in Sec. 4 hereof.

6. To pay to the party of the second part the sum by which the receipts for each year of this agreement exceed 35 cents for each car-mile operated during that year, if there be such excess; provided, however, that this sum shall not be greater than 5 cents per car-mile operated under this agreement, and to retain all, if any, excess above 40 cents for each car-mile so operated.

ARTICLE II

The party of the second part agrees:

1. To deliver all scheduled, extra or special passenger cars to the party of the first part in good operating condition.

2. To report promptly to the party of the first part all accidents occurring out of the operation of cars under this agreement known to the party of the second part, and to assume and pay any and all expense caused by failure to make such reports.

3. To furnish, monthly, to the party of the first part schedule of regular runs and to report any changes therein promptly to the party of the first part.

4. To report, daily, all trips of extra and special cars and to forward trip-sheets and registed readings to the party of the first part each day.

5. To pay 50 cents per car for each day or part thereof any of its cars are stored on the property of the party of the first part.

ARTICLE III

The parties mutually agree:

1. That this agreement shall be for a period of five years, ending Nov. 30, 1927, and shall cease and terminate with that day.

2. That this agreement shall inure to the benefit of and be binding upon the parties hereto, their respective successors and assigns.

3. That the party of the first part shall receive not less than 35 cents for each car-mile operated under this contract and not more than 35 cents unless the earnings on such operation in any one year of this agreement shall exceed 40 cents per car-mile.

4. That the cars covered by this agreement are to be equipped with couplers and manned by crews acceptable to the operating officers of the party of the first part.

5. That all motormen and conductors operating cars under this agreement shall be under the immediate jurisdiction of the party of the first part, and discipline imposed by the party of the first part shall be final.

6. That all invoices shall be paid on or before the 20th of the month following the operation for which invoice is made.

7. That each party may have access to the records of the other so far as they relate to the carrying out of this agreement.

8. That this contract shall not be binding upon the Cleveland Railway unless and until approved by the Council of the city of Cleveland.

Carrying Safety to the Public—III*

How the Schools May Be Used as a Means to Reach the Entire Community—Proper Methods of Instruction of First Importance in Effective Safety Teaching

By C. W. Price
Vice-President in Charge of Public Safety,
Elliott Service Company, New York City



Safety Is Used Effectively as a Subject in the Drawing Class

IN ANY effort to reach an entire community with the safety idea, the secret of success is to utilize the existing civic agencies. The public and parochial schools offer by far the most effective agencies through which to impress large numbers of people. Half of all that can be done to reach not only the children but the adults will be done through systematic, daily instruction in safety in the schools. Electric railway executives long have appreciated the value to them of safety instruction.

For ten years safety had been taught in a systematic way in many schools, but with no appreciable results in reducing accidents. The method consisted usually of a ten-minute talk once a week, and a few posters.

Dr. E. George Payne of the department of Sociological Pedagogy of New York University first developed a successful plan of safety instruction in 1918 in the schools of St. Louis. More recently he has prepared complete material covering safety instruction, for the use of superintendents and principals, and monthly leaflets for teachers. This material is based on the experience in many schools in which successful work has been done.

The Payne plan does not add another subject for study to the already crowded curriculum; it provides for the use of a safety material in each of the studies already included. To illustrate: at least once each week in the drawing class each child designs a poster on safety. I have seen posters illustrating every kind of hazard, from putting up a stove pipe while standing on a step ladder, to the right and wrong ways of alighting from a street car.

In the writing lessons the children copy such sentences as this: "When I start across the street, I look to the left, and when I get to the middle of the street, I look to the right."

Safety material, so the educators testify, lends itself to the teaching of reading and composition better than many of the standard kinds of material. It is found that in this use of safety material, the children get just as much drill in drawing, writing, reading and composition, and at the same time get valuable suggestions in safety.

In each school room a safety patrol, consisting of three to five children, is appointed to help keep its room on the banner list for freedom from accidents. One of the duties of this patrol is to guard the streets when school is dismissed, and to warn the children against crossing the streets when cars or automobiles are approaching.

In the schools of Cincinnati there are 13,000 "Safety Guards." Each child has been pledged individually to do three things: play safely, warn others, and, if opportunity offers, save human life. Some months ago a mother stepped out of her door and saw her two-year old baby boy toddling out on the railroad track. Then she saw that he had caught his foot in the frog. She looked up the track and saw a freight train backing down toward the child. She lost control of herself and

*The third of a series of ten articles.

began screaming. A boy 200 ft. down the track heard the screaming, rushed up, grabbed the child, tore the sole off of his shoe and rescued the little fellow just before the train reached him. Some one asked the boy, "Johnny, how did you come to do it?" He replied, "Well, I was playing down the track. When I heard the mother scream, I turned round and noticed the child, and I saw he was going to be killed. Then I remembered that I was a safety guard and had promised to save human life."

Now that boy had not only got the safety idea into his mind, but he had put into his very soul the sort of courage and unselfishness which we need in our future citizens.

Through the use of safety material in at least one study each day, and through the activity of the safety



This "Safety Patrol" Shows How Even the Smallest Kiddies Can Get the Idea

patrol, safety is made an active and vital part of the child's daily life. This is the secret of the success of the plan.

Three facts stand out in the experience of hundreds of schools in which safety instruction has been given successfully during the past four years:

First: Accidental deaths to children of school age have been reduced materially. In St. Louis, for instance, forty-nine school children were killed in 1919, and only twenty-five in 1922, in the face of a 45 per cent increase in automobiles. In Detroit deaths to school children were reduced from ninety-six to thirty in two years. In both of these cities systematic safety instruction was made a part of the school curriculum.

Second: Safety material has proved to be more vital, more interesting to the child, and more valuable from the standpoint of the education of the child, than the old material. The introduction of safety instruction is quite in line with the modern development of pedagogy. More and more the demand is coming among progressive educators for material which is vital and familiar to the child's daily life.

Parents are demanding that their children be equipped not only to cope with the environment in which they will live as adults, but with the present environment in which they are living as children. The prime consideration is to train the child, first, to preserve his life and limb, and second, to conserve his health.

Educators are also seeking to train the children in good citizenship. This can be done only by allowing the children to participate actively in work for the improvement of the community. Safety lends itself admirably to this training, better than do most other activities in which the children can engage.

Third: The most direct and effective means thus far discovered of reaching and convincing the adults of a community is through the message carried home by the school children to their parents. It is found when safety has been made a vital part of the daily school life, the children become enthusiastic advocates of safety in the home. Parents who might be indifferent to an outside appeal seldom will turn a deaf ear to the appeal of their own children for safety.

Employers of labor were among the first to see the far-reaching value of safety instruction in the schools. They not only saw its vital bearing on public safety, but also its direct effect on industrial safety, appreciating that if the workmen were reached through their children and impressed with the safety idea, they would come back to their place of employment not only interested in safety as employees but as fathers and citizens convinced of its necessity.

Because of the widespread interest in most communities in safety, especially traffic safety, it is comparatively easy to persuade school authorities to adopt some form of safety instruction. It is much more difficult to persuade them to install the right plan of instruction, using safety material in the studies and organizing safety patrols. Unless they are fully informed regarding the details of the method, and are convinced that it is practical to make safety a vital part of the curriculum, they may adopt some poorly-planned method which will not get results. It is, therefore, advisable to place in the hands of the school authorities full information regarding the methods used and the results achieved in other cities.

It is found that many teachers are willing to teach safety, but are unable to do the most effective work unless suitable material is furnished. The Washington Safety Council has adopted a plan of furnishing a monthly bulletin to each teacher in the public and parochial schools. This bulletin contains a complete analysis, by causes, of the accidents of the previous month, along with a half dozen stories of accidents to children. Suggestions regarding points to be emphasized, and items regarding what various schools are doing, are also included.

What Is a Living Wage?

The Chairman of the Labor Board Tells Why It Did Not Attempt to Answer that Question

MUCH has been said about the need of a "living wage" in arbitration hearings during the past five years, but those who have attempted to decide impartially in dollars and cents just what this wage is, under American conditions, have found the task a difficult one. To begin with, the expression may mean to some people bare subsistence, to others it implies a greater modicum of comfort, while to a third group it may be considered to be an income sufficient to insure such savings as will provide support during ill health and old age. It is interesting, therefore, that Ben W. Hooper, chairman U. S. Railroad Labor Board, contributes an article to the June issue of the *Nation's Business* in which he discusses the entire subject, as it has been presented to that board.

It seems, to quote from Mr. Hooper's article, that during the railroad wage arbitrations the board was asked to fix for the unskilled and lowest-paid worker on the railroads a wage sufficient to maintain a family of five in health, decency, and reasonable comfort, and above this basic living wage to establish differentials for the higher grades of railroad workers, according to skill, hazard, responsibility, experience, training and productive efficiency. Thereupon, representatives of labor organizations presented budgets for such living, varying from $1,750 to $2,637 a year, with a figure prepared by the Bureau of Labor Statistics, $2,133, part of the way between. These budgets were intended to cover only the basic wage which common labor required under the conditions specified. It was discovered, however, that when

the lowest of these scales was used for calculation, with the existing percentage differentials maintained for skilled labor, that their payment would have meant an annual deficit on the railroads of more than two and a quarter billion dollars, on the basis of the revenues of 1921. Still further calculation showed that if this annual income of $1,750 had been received by each of the 25,000,000 families in the country, and it was thought that the employees of other industries were as justly entitled to it as were the railway employees, the total would be somewhat in excess of the latest estimate of the total annual income of the people of the United States. Finally, it was found by calculation that if the 25,000,000 families in the country should receive the highest scale mentioned for common labor, or $2,637, the total would be nearly $26,000,000,000 in excess of the country's total income. Mr. Hooper naturally says in his article in this connection: "Wonder where the excess would come from!"

These figures naturally led to a recast of the entire situation.

In the first place it was found that according to the census of 1920 there was in each family in the country an average of only 4.4 persons and not 5, an average of only 1.4 dependent children under sixteen years of age and not 3, and an average of 1.36 male workers instead of 1, as assumed in a number of the budgets submitted to the board. The facts were also realized that the common laborer does not always have to remain in that capacity, that some of the comforts and conveniences which he might like to have necessarily must be deferred until thrift has resulted in accumulation, and a fair degree of contentment and even happiness may be enjoyed with a low wage under conditions of self-denial.

Finally, it was also pointed out that the transportation law, under which the board was appointed, does not require the board to determine what constitutes a "living wage," but wages that are just and reasonable, and Mr. Hooper points out that these words imply a wage which is just both to the railroad and the employees and consequently to the public at large. In conclusion, he says, in part:

> It is by no means my purpose to indicate that laboring men on the railroads or elsewhere should be discouraged from rational efforts to improve their wages and working conditions. Standards of living have gradually advanced in this country and must continue to do so. It must not be forgotten, however, that the worst legacy left us by the war was that of wasteful and extravagant habits of living in all classes of our people. These cannot be expected as the normal standards of sensible and wholesome living.

Belt Lines Abandoned and Through Routes Established

Second Section of Beeler Report Recommends Revision of Practically Every Route in New Orleans—Four Through Routes, Seven Crosstown Routes and Express Service Are Features—Traffic Conditions Will Be Simplified

AS MENTIONED in the digest of the Beeler report on the New Orleans street railway situation published in this paper April 28, the survey included a plan for extensive rerouting of lines. Four main features will be accomplished by the rerouting. A set of through cross-city lines will be established, connecting important residence districts with industrial centers. These are the Tchoupitoulas-Gentilly, Tulane-St. Claude, Claiborne Avenue and Napoleon-Broad lines. At least three of these lines undoubtedly will prove to be most important factors in the future growth of the city. Independent crosstown lines will be established, giving a type of service better fitted to the needs of the population and acting as feeders and distributors for the inbound and outbound lines. Express and semi-express service will be provided on certain routes, which have the advantage of operating over "neutral ground" for the greater part of their length, thus assuring more rapid transportation on certain important routes. In addition to the changes, the proposed routing will extend service into a dozen or more localities now entirely without or with only very limited facilities.

The proposed routing plan shows great simplification over the present. The turning movements are less and interlocking and duplication of routes are reduced. By operating crosstown lines exclusively as such, instead of endeavoring to furnish this kind of service with the ends of through lines, the proper type and amount of equipment can be placed where it will do the most good.

The length of route has been reduced, the average round trip distance of each of the present routes being 9.03 miles, and of the proposed route 8.34. The length of run between layover points is reduced from the present figure of 7.37 to 5.73 miles.

According to the report, the present routing plan shows a duplication of routes in some localities and a lack of facilities in others. A futile attempt is made to give crosstown service by extending tail ends of trunk lines, accommodating a few at the expense of many. The belt lines, too, have a tendency to limit expansion, and their unbalanced loading is an objectionable feature. Many of the routes are indirect; their devious windings slow the car service and conflict with the movements of general traffic. The city of New Orleans has outgrown a system of routing that requires all car lines to concentrate in one heterogeneous tangle in the congested area.

The unequal distribution of service under present conditions is shown in the accompanying routing diagram. Some twenty-six lines are operated, all but one of which reach or run on Canal Street.

Details of the Plan

The most striking feature in this routing is the breaking up of two old-established belt line systems, the St. Charles and Tulane Avenue on one side of the city and the Canal Street and Esplanade Avenue on the other side. It was found that the traffic on these belts was badly unbalanced and that much service was being wasted on the light sections in order to handle the

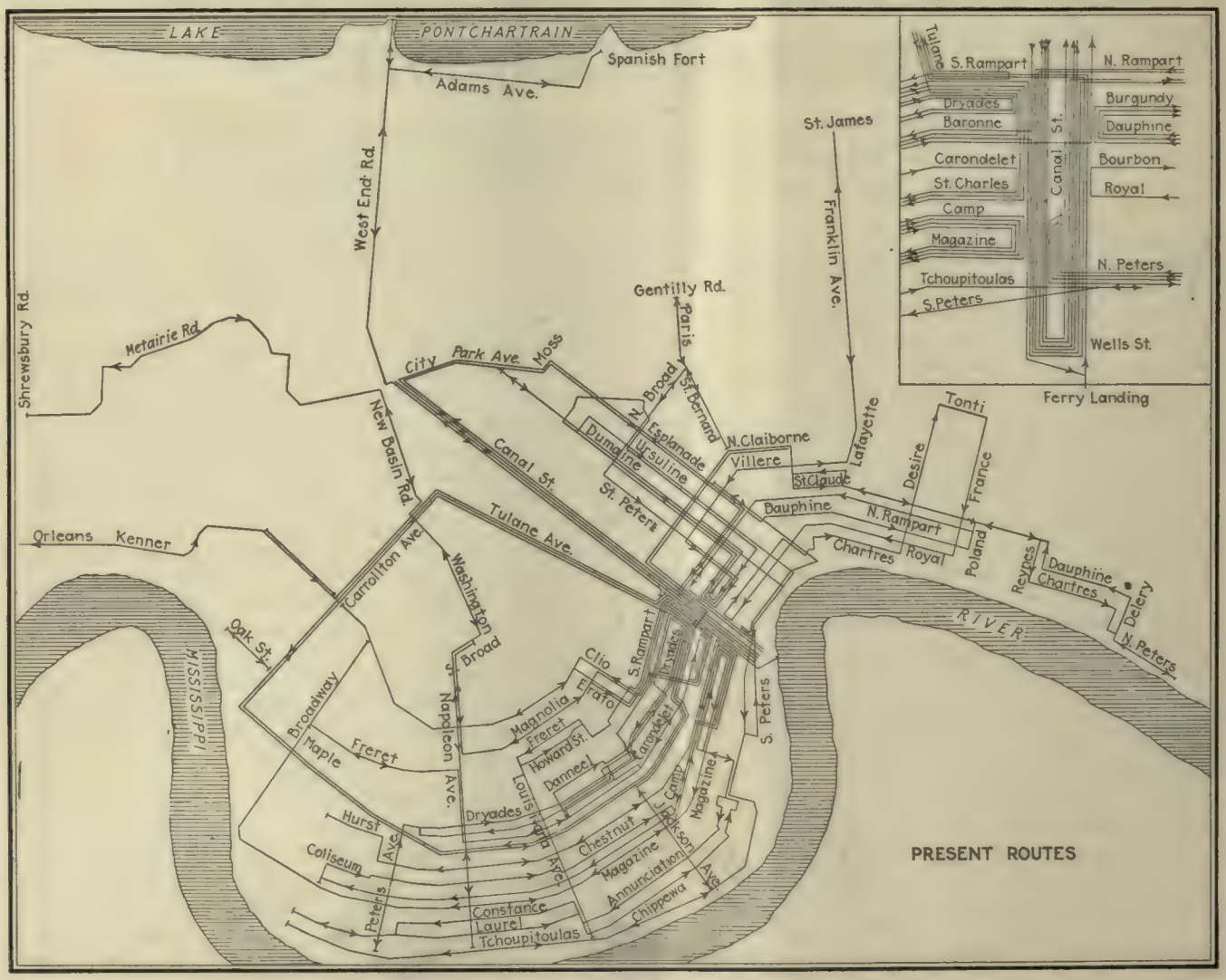
business on the heavy sections. The proposed Tulane-St. Claude Avenue through line, which will take over the Tulane side of the St. Charles-Tulane belt, connects a very heavy residential district on the uptown side of the city with a large industrial district in the downtown section. In the past there has been a great deal of transferring in the vicinity of Canal Street, and it is anticipated that the establishment of this through line will reduce that to a minimum.

The Canal Street line, formerly one side of the Canal-Esplanade belt, will be given an independent service that may be more readily adjusted to care for the heavy volume of traffic here. It will be free from the difficulties at present encountered from the unbalanced traffic on Esplanade Avenue and the still lighter travel on City Park Avenue. Semi-express service is recommended for this line, the stopping places being two to three blocks apart.

The other side of the present belt line, operating principally on Esplanade Avenue, will be given a separate route coming in on Dauphine street. It will make a one-block loop on Canal Street and go out on Burgundy Street. This will be a much lighter line than the Canal Street line and better fitted to the needs of its territory.

St. Charles Avenue, formerly covered by the St. Charles-Tulane belt line, will be given independent service by a new route operating on St. Charles Avenue from Carrollton Avenue to Canal Street. This route, operating midway between the river and Claiborne Avenue, is undoubtedly destined to be, considering its length, the heaviest car line in the city. It traverses for its full length the city's best residential section, affording direct connection to the retail business district. The population served is large and growing. Except for the comparatively short distance between Canal Street and Lee Circle the tracks are in the center of the "neutral ground," or center parkway, and free from all interference of street traffic except at the cross streets. Advantage should be taken of this condition to establish express service on this line. This will have many of the advantages of real rapid transit service, without some of the numerous disadvantages of an elevated or subway line. The location of the stopping places will have to be revised on St. Charles Avenue. From Carrollton to Lee Circle, a distance of 4.5 miles, there are at present seventy-six stopping places, or practically seventeen to the mile. It is proposel to reduce these to twenty, averaging a little more than a quarter of a mile apart. This will permit an increase in the schelude speed of 50 per cent in this section.

The general layout of the majority of the other lines will not be radically different from what it is at present, although a number of rearrangements of tracks have been made in order to eliminate unnecessary lines and to straighten out the remainder to give better distribution. The proposed changes in the track layout were



Present Routing of New Orleans Street Car Lines

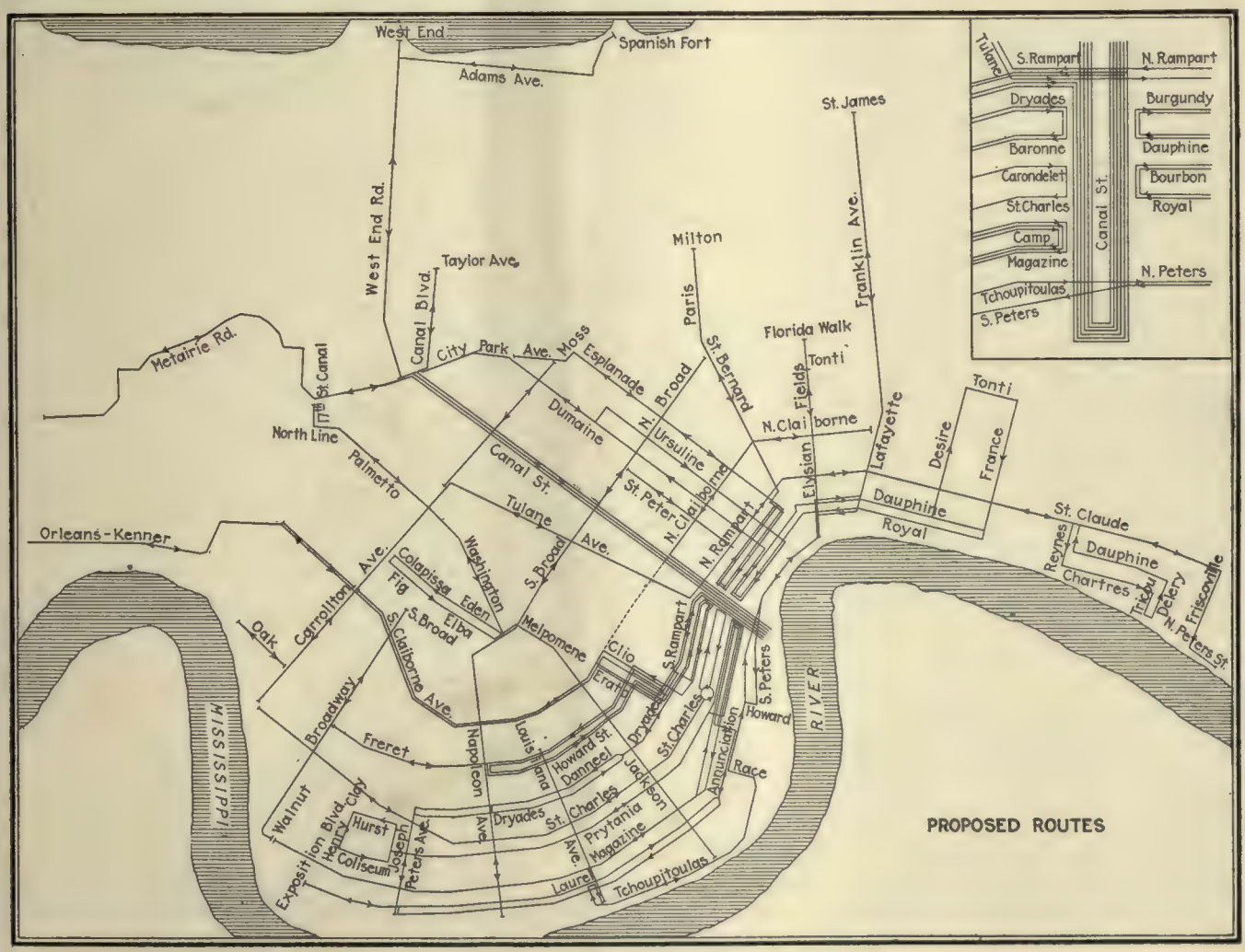
described in the April 28 issue and are shown in the map on page 717.

Apart from the through lines, the service reaching the business district will, in the main, be given by a series of lines terminating at or on Canal Street, as at present, but including a rearrangement which permits a material simplification of the Canal Street tracks. This is treated in a later section of the report.

A number of crosstown lines are recommended in addition to the through lines, which in themselves give a good deal of crosstown service. There are seven of these lines proposed, some of which are on existing tracks and some on tracks recommended for construction. They are the Carrollton Avenue, Broadway, Napoleon-Broad, Louisiana, Jackson, St. Peter and Elysian Fields lines.

Two lines operating beyond the main portion of the city have been given special treatment. The Spanish Fort line and the Orleans-Kenner interurban, which now terminate on South Rampart Street, just off Canal, are serious factors in the congestion at that point. It is recommended that the Spanish Fort line be continued down Canal Street to the river, where ample facilities for layover storage of trains required for the heavy excursion business are provided by the Wells Street loop and extra tracks at the foot of Canal Street. It is recommended that the Kenner interurban be terminated in the spacious neutral ground on Howard Avenue. This would give the interurban line an extension to the central portion of the city without interfering too much with the local street cars and the general street traffic. This routing would also be more convenient to the majority of the riders. It would, of course, require the Orleans-Kenner line to change its track gage to 62½ in. from the present standard gage of 56½ in.

One feature of considerable importance is a rearrangement of traffic direction on the streets adjacent to Canal Street. Numerous plans have been tried in the past few years, but no comprehensive arrangement has been provided that will take care of the growing traffic. The report proposes that the streets from Rampart to the river alternate in traffic direction, and that the street cars follow the general direction of traffic. This has been extended so that the same traffic direction will apply on both sides of Canal Street. In the past in some cases the traffic has been reversed on the opposite sides of Canal Street, thus reducing the value of these streets. Baronne Street, which has been a two-way street, will be made to conform to the general plan. This necessitates the removal of the St. Charles Avenue line from this street, to which it has been confined because of the use of standard gage tracks. The St. Charles line, it is recommended, should enter the city in the downtown direction on Carondelet Street and return on St. Charles Street. This rearrangement of routes from the uptown section will equalize the street car traffic on these various streets and should reduce congestion materially.



Routing for New Orleans Proposed in Beeler Report

Federal Judge States Situation Impartially

While Ordering Receivers of Kansas City Railways to Rebuild Half-Million-Dollar Elevated Structure, Judge Kimbrough Stone Explains Clearly Why Railways Should Not Be Required to Carry Unnecessary Burdens

AN ELEVATED structure, owned by the Kansas City Railways and connecting the two Kansas Cities across the "West Bottoms" and the Kansas River, was recently condemned and railway service across it was discontinued in December, 1922. The railway, however, has been giving a partly equivalent service over the "Inter-City Viaduct" owned by the two cities. For this privilege the receivers pay $30,000 per year.

On May 10, Judge Kimbrough Stone of the United States District Court for the western division of the western district of Missouri, on complaint of the Kansas City Refining Company, and after proper hearings, ordered the reconstruction of the elevated structure at a cost not to exceed approximately $500,000 and on condition that the two cities relieve the railway of any obligation to use the viaduct and pay rental for the privilege of using it.*

Accompanying the order Judge Stone explained explicitly the local conditions leading to it. He pointed out also that as a general proposition the burdens placed upon an electric railway property which have no relation to the furnishing of its service to the public should be removed. These burdens consist of paving, viaduct building, street cleaning, license taxes and other like exactions. An abstract of part of his statement follows:

In the long-buried past exactions such as those mentioned were excusable if not, indeed, justifiable, but the conditions upon which such exactions originally rested have forever disappeared. Then every one used street cars because there was no other general means of city travel and the street railway companies, because of lack of strict regulation as to fares and earnings, could and often did make considerable earnings upon the investments. Under such conditions it was not unfair, either to the public or to the companies, to require payments of this character. They, usually, came out of the surplus earnings and constituted a form of indirect taxation.

Now, close public scrutiny and regulation of capitalization, earnings and fares prevent the companies from earning more than reasonable returns, even if street railway business conditions were such as to permit earning a surplus beyond such reasonable returns. But the business conditions now and permanently surrounding this business have affected and will continue to affect drastically the earning power of street railways. These changed business conditions are caused primarily and chiefly by the enormous use of private automobiles. The important effect of this element is shown by the circumstances that although the receivers of the Kansas City Railways are operating more cars over as much or more mileage as used in 1917 (shortly before the more general use of the private automobile began to be felt) and although the service is good and the public feeling toward the receivers seems favorable, yet the earnings, in subsequent years, of the business have never equalled those of 1917. In these two cities of approximately 500,000 people there are more than 50,000 licensed automobiles. Most of these are in daily use and much of that usage replaces what would otherwise be street-car travel. As the poorer classes of citizens only are compelled to use the street cars, the indirect taxes, such as those referred to above, now fall upon only a portion of the community, and this portion is made up largely of those least able to bear tax burdens. Therefore, these exactions are unfair and unjust to the public. Also, they aid in preventing, if they do not in themselves prevent, reductions of fare. In some cases they may necessitate raises in fare. They affect fares for the following reasons: The companies are entitled to receive a reasonable return on the fair value of the investment; the courts will enforce this constitutional right; the private automobile has made it very difficult for street railways to earn this reasonable return; the only substantial source of revenue is the fares; therefore, any substantial payments taken by the cities from the fare revenue are likely to be reflected in the rate of fare.

Under present and, so far as can be seen, future conditions there is but one way to secure for the people this transportation so vital to them and these communities, and to secure it upon a basis fair alike to public and serving company. That way is to relieve the business and its patrons from all of these burdens; let it confine its expenditures to furnishing good service and to paying those general taxes which all must bear; closely supervise service with a view of making and keeping it good; closely supervise all expenditures to secure economy in operation; closely supervise net earnings with a view of confining such to a reasonable return upon the fair value of the property; keep fares at the lowest point which will furnish the required service and the reasonable return.

*Exceptions to this order were taken by the Continental & Commercial Trust & Savings Bank and E. F. Swinney, trustees under the first mortgage or deed of trust. Appeal was allowed to the Circuit Court of Appeals for the Eighth District and the appellants are given until June 10, 1923, to file assignments of error and bond.

How a Railway Can Help Out in an Emergency

THE accompanying views show how obsolete cars proved useful to house many members of a district devastated by fire. Last October an area of approximately 1,200 square miles in the woodlands some 300 miles north of Toronto, known as the Haileybury district, was swept by a forest fire, which rendered many of the inhabitants homeless. A committee known as the Northern Ontario Fire Relief Committee was organized, and eight days after the fire began, or on Oct. 12, the committee shipped to Haileybury eighty-five old cars which were formerly operated by the Toronto Railway to assist in providing temporary shelter to some of the families.

The views published below show three of the cars after they had been placed and fitted up with shades and stoves and otherwise made suitable for improvised houses for the refugees.



These Cars Made Very Comfortable Homes, Even in a Northern Latitude, in a District Which Had Been Swept by Fire

The Readers' Forum

More About Pavement Heaving Outside of Track Area

LEHIGH VALLEY TRANSIT COMPANY

ALLENTOWN, PA., May 8, 1923.

To the Editors:

The track construction described by A. Swartz on page 769 of the issue of the ELECTRIC RAILWAY JOURNAL for May 5, 1923, while very substantial, would seem not to take care of frost penetration along the edge of the adjoining highway. Mr. Swartz's letter was brought out by an article in the April 21 JOURNAL, page 677, in which certain construction in Allentown was described.

It is also a question whether the seepage that must occur within the track area and along the rails is taken care of, as no mention is made of any center drain to serve as an outlet.

We feel that the curb wall, to be effective, must be wholly outside of the track area, constituting a part of the adjoining roadway. The cost of this would be a part of the cost of the roadway, whereas in the case described by Mr. Swartz the railway assumes the full burden of what would seem to be rather expensive construction.

C. C. SMITH,
Engineer of Maintenance of Way.

[EDITORS' NOTE.—Mr. Smith's letter was forwarded to Mr. Swartz, who replied as below.]

TOLEDO & WESTERN RAILROAD

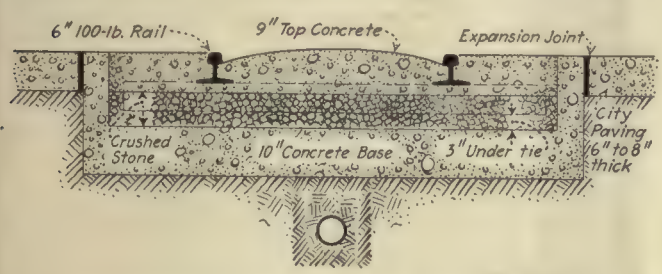
SYLVANIA, OHIO, May 15, 1923.

To the Editors:

I take pleasure in replying to the questions raised in Mr. Smith's letter as follows:

When I wrote the letter published in your issue for May 5 I was under the impression that the construction used in Allentown was practically identical with that which I described, but believe now it is not quite the same.

Our construction is shown in the accompanying cross-section, where it will be noted that we first built a



Cross-Section of Concrete-Trough Track Construction

trough in the shape of a channel which is entirely separated from the adjoining pavement on either side by means of the expansion joint. Theoretically, the cost of the curb wall ought to be a part of that of the city pavement, but our idea in paying for it was that if there should be any bad results to the paving outside the track the expansion joint would make so distinct a line of demarcation that there would be no question as to which party was responsible for the results.

The additional cost due to the use of the curb is not great, and most municipalities would be willing to assume a portion of its cost and that of the expansion joint. I believe that the village of Metamora, mentioned in my letter, did assume a portion of this cost.

As for the frost penetration of the edge of the trough, the greatest detrimental results would be to the adjoining pavement and not to the track pavement. The railway company has no interest in the outside pavement if the municipality does not make its pavement of such depth as to resist frost.

As the Toledo & Western handles heavy freight traffic, the construction is so substantial that the bottom of the foundation is approximately 25 in. below the top of the pavement. This is below the average frost line in streets.

To take care of the seepage in the track area, we put in drainage outlets in the center of the track at intervals. In places where the subgrade is soft, it would be advisable to lay a drain tile in the center of the track strip, covering it with cinders and connecting it with the drainage outlets where they occur.

A. SWARTZ,
Manager for Receivers.

Number of Conductors on Three-Car Train Is Purely an Operating Question

DEPARTMENT OF STREET RAILWAYS

DETROIT, MICH., May 22, 1923.

To the Editors:

We note in your issue of May 12 the question of the number of operators required for our contemplated three-car-articulated train has brought forth some comment, and while we may overlook a bet sometimes, we have not in this instance. We cannot conceive at present of a more flexible unit for operator economy, as there is a free inclosed passage from car to car, thus allowing the placing of the three cars in charge of but one conductor. The number of conductors to be used is purely an operating matter, and will probably be determined after a careful study of traffic conditions, but if the maximum was decided upon there would still be a slight saving in man-power.

It may eventually be found that the density of traffic has some bearing on the advisability of reducing operator power to the minimum. On this question the past affords some guidance. Thus, when the first electric cars were found inadequate from the standpoint of size, there was an immediate switching to the heaviest street cars that could be built. When these were found to be expensive to operate, the other extreme in the single-truck safety car was supposed to end all trouble, regardless of service conditions. Experience with it hardly proves this to be true. The principle of determining the proper sphere of usefulness for the various ideas and using them in their places would have saved some money and worry in the past and perhaps may apply in the one-man car situation.

A. C. COLBY,
Superintendent of Equipment.

The Detroit municipal railway is putting in the hands of all its carhouse foremen a blueprint book giving miscellaneous information of help to them in specifying parts which they use. This information includes the names of parts of the trucks and car equipment which might give out, a list of the fuses used, etc. The purpose is to have a standard nomenclature on the system for these parts. The pages measure 8½ in. x 11 in.

Association News & Discussions

Collisions as the Motorman Sees Them*

Education of Automobile Drivers and Electric Railway Employees Is Necessary if the Collision Evil Is to Be Controlled— Author Makes Concrete Suggestions

By Elton S. Wilde
General Manager Union Street Railway, New Bedford, Mass.

BEFORE discussing this topic let me submit, as a basis, the following figures obtained from the experience of the company with which I am associated:

MILES OPERATED PER ACCIDENT

	1910	1915	1920	1922
Car collided with auto driving out of intersecting street, driveway or garage	435,948	62,841	44,615	47,259
Auto driving out of intersecting street, driveway or garage collided with car	116,252	58,830	29,171	26,300
Car and auto going in opposite directions on straight track collided	348,758	95,346	32,622	37,807
Car and auto going in same direction on straight track collided	1,743,791	106,347	19,080	20,163
Car while going around corner, taking curve or turnout, collided with auto	249,113	230,419	50,564	57,067

To the classification "passenger car and automobile going in same direction on straight track" is assigned the cause of most of our auto accidents in New Bedford. These accidents, I may add, are caused mostly by our extremely narrow streets. Automobiles park alongside our tracks. Then without warning they turn into the track area, and we are very lucky if we only hit the automobile turning onto the track, for usually the one we hit is pushed or jammed into a second automobile parked ahead of it, thus causing damage to two automobiles.

I am sincere when I give as my opinion that the drivers of automobiles are more alert in preventing accidents today than the old time wagon driver. The old time driver had a partner in his horse, sometimes good and sometimes bad, but taking the automobiles and horse-drawn vehicles on an equal basis as to numbers I would rather take my personal chances with the automobile.

The analysis of Chauncey Hubbell of the State Registry of Motor Vehicles is interesting and bears out our own experience. He claims that in 1919 the ratio of deaths to automobile registration was 0.00223 and in 1922 it was 0.00113. In 1919 the same ratio was 0.06243 and last year it was 0.0331.

Holding no brief for the automobile driver and being on the other side of the fence, I don't know that I should cite these favorable figures. In order that we might get first hand information on "Collisions as the motormen see them" I requested some of our motormen to state their views, and here are some of their replies:

"Of all the causes of collisions with autos, it seems to me that high speed on the part of one or both operators is the most frequent. If one is careful he usually can save the other fellow, but when both are speeding no amount of skill can save them. Defective brakes are another cause. This applies almost wholly to the auto, for except at times of slippery rail the motorman, with the aid of a level head and plenty of dry sand, can generally stop where he likes. Inattention to duty is often the cause of collisions. The motorman or the auto driver may be looking behind him or have his mind diverted to something else. Before he knows it an accident has happened."

"The cause of a great many collisions with automobiles is the carelessness of the automobilist who will not wait a few seconds. For example, an auto and a trolley car are going north and an auto parked on the street tries to cut between another auto and the trolley car. The motorman may bring his car to a slow pace, but this cannot be done in all cases, for the trolley car sometimes is speeding so fast that the auto driver 'shoots' across the track and causes an accident. Accidents usually are due to negligence of one of the parties; therefore, one must be always on the alert and not take any unnecessary chances. Autos are often started from the curb without first giving any signal."

The auto and auto driver do create new problems for street railways and I feel the main cure is education, not only for chauffeurs but for our own employees. It is a fifty-fifty proposition. Everything in safety propaganda pays. The employers have a duty. Employees will lose interest and enthusiasm in any accident prevention movement if the management is indifferent.

All faulty equipment should be eliminated or corrected.

Managers of street railways should co-operate to try and establish Federal regulations, more particularly as to traffic laws. The obligations and rights of the driver and the pedestrian should be definite and should be uniform in all states. Who can tell whether it is permissible in the next town to pass a street car on the left side, turn in the middle of the block or run by a standing car? Managers of street railways should co-operate with safety councils toward abolishing the parking on car lines in the business district.

I would recommend a Federal law so that all gear shifts would be uniform; that is, I would have the gear shift of the Buick car, for instance, identical with the Cadillac and all other makes of cars. I would recommend that the registrar of motor vehicles in sending out license plates and operators' licenses accompany them with pamphlets preaching the gospel of safety. I would also recommend that the executives of street railways co-operate with their local Chambers of Commerce and endeavor to induce them to organize and maintain safety councils as a part of the organization.

*Abstract of address at the second annual conference of the Massachusetts Safety Council, Springfield, Mass., April 25-26, 1923.

Specifications for Paint Pigments

SPECIFICATIONS for analysis of white, yellow, orange, red and brown paint pigments containing iron and manganese, and of dry red lead, have been approved as tentative American standards by the American Engineering Standards Committee. They were presented by the A.S.T.M., which has been designated as sponsor for these specifications. The specifications include methods of determining specific gravity, tinting strength of the color pigments and moisture, and detailed methods for various chemical determinations.

National Investigation of Coal Situation

THE Federated American Engineering Societies have appointed a committee to direct a national investigation of the storage of coal in co-operation with the United States Coal Commission, the Department of Commerce and the Bureau of Mines. W. L. Abbott, chief operating engineer Commonwealth Edison Company, Chicago, Ill., is chairman. The main committee will work through state committees, studying local conditions through local engineers in an effort to find a solution for the problems of coal consumers, from the small household to the largest industry.

The factors involved include the question of financing and providing means whereby coal in storage may be used as collateral; amounts of coal consumed

at different periods, particularly by industries; provision by industrial organizations to aid the workers of the nation in securing coal supplies during the summer at a low cost; methods of handling and storing; effect of storage on the heating value of coal; transportation facilities; allaying labor unrest, and reducing the number of mines and miners.

The first full meeting of the engineering investigating committee was scheduled to be held in Washington, D. C., on May 25, and a preliminary report on the progress of the inquiries will be submitted to the executive board of the American Engineering Council, the executive body of the Federated American Engineering Societies, at a meeting to be held in St. Paul, Minn., on June 8 and 9.

Public Utilities Advertising Association

ACCORDING to a statement by W. P. Strandborg, Portland, Ore., president of the recently formed Public Utilities Advertising Association, his organization will hold a formal get-together business meeting in connection with the annual convention of the Associated Advertising Clubs of the World at Atlantic City, June 3 to 7. The organization is now an official member of the Associated Advertising Clubs' family, and one of the twenty-three departments in the National Advertising Commission. At the convention there will be three formal sessions, on Tuesday morning and afternoon, and Wednesday morning. At the Tuesday sessions there will be addresses of importance from the standpoint of public relations and technical advertising, while the Wednesday morning session will be devoted to the business affairs of the association.

Among the speakers who have already agreed to address the meeting are P. H. Gadsden, vice-president United Gas Improvement Company, Philadelphia, Pa.; Francis H. Sisson, vice-president Guaranty Trust Company, New York, N. Y.; W. H. Boyce, general manager Beaver Valley Traction Company, New Brighton, Pa., and Grover T. Maxwell, former secretary Ohio Public Service Commission. There will also be talks by a number of members of the association, giving the results of their experiences in publicity work.

Annual Convention of Southwestern Association

THE Southwestern Public Service Association and the South Central Gas Association closed their three-day annual conventions, held jointly, in Fort Worth, Tex., on Thursday, May 17. Joe H. Gill, general manager Dallas Power & Light Company, was elected president of the Southwestern Public Service Association, which hereafter will include the South Central Gas Association, the latter having been merged in the larger organization. Other officers elected are C. B. McKinney, Dallas, first vice-president; H. E. Bolton, Calvert, second vice-president; George I. Plummer, Dallas Railway, third vice-president; F. J. Gannon, Fort Worth, treasurer. The selection of the convention city for next year as well as the election of a secretary was left to the executive committee.

New members of the executive committee are: G. W. Fry, Abilene; F. M. Hoag, Dallas; E. T. Keck, Dallas; C. M. Armbruster, Shreveport; H. B. Flowers, New Orleans.

Resolutions of regret at the death, during the year, of Judge M. B. Templeton of Dallas, one of the founders and at the time of his death a member of the general counsel for the Texas Electric Railway, and of Charles Dillon, of the Shreveport Traction Company, were adopted at the closing session.

More than 200 executives and other officials of utility companies in the Southwest were present when the convention was called to order Tuesday morning by R. J. Irvine of Jacksonville, Tex., president of the association. The president in his annual address attacked the use of improved highways by motor trucks in the transportation of freight and passengers as wasteful competition with the electric and steam railways.

Mr. Irvine stated forcefully that the hard surface highways were being destroyed by heavy hauling, and that millions of dollars of the money paid in taxes by the public generally was going to enrich the few motor truck operators who paid little or no taxes. The principle of taxation for highway construction and upkeep is wrong, he said, declaring that those who use the highways most should be made to pay most for them.

"Where our highways parallel steam railways and interurban lines, and are used to carry freight and passengers for hire, the detrimental effect is to reduce revenues of those companies which pay a very large portion of the original cost of highway construction and also most of the cost of maintenance. Such abuse of our highways renders them unsafe and unfit for the purpose intended," Mr. Irvine declared.

In discussing dealings with the public, Mr. Irvine declared that he is inclined to assume the attitude that the public is always right and charged those attending the convention to be attentive to small grievances and seek to establish a thorough friendship for their company.

The speaker also dealt with the use of electric motor trucks in handling of house to house deliveries and asserted that electric trucks will show a great saving over gasoline-driven trucks for such service and that the greater the number of stops the greater the saving that will be shown.

The second day of the convention was given over largely to a discussion of the relations between the public utilities and the general public, and all the speakers stressed the importance of maintaining close and friendly relation with the public. W. B. Tuttle of the Public Service Company of San Antonio was chairman of the session, and introduced H. B. Abell of New York, chairman of the committee on public utility information of the National Electric Light Association. Mr. Abell pointed out the necessity for concerted efforts on the part of all utility companies to keep in close contact with the public and the advantages of adjusting all differences promptly and satisfactorily.

"The public and the newspapers," he said, "should be curious for the facts, but should not be suspicious. Their greatest interest is in good service and a fair price."

He referred to the cries of men whom he styled as "demagogs," who, he said, are continually crying that utilities abrogate their contracts and he asserted that public utilities are in a vulnerable position for adverse attacks by such men. He attacked unregulated competition and suggested education as its cure.

George H. Clifford, vice-president and general manager of the Northern Texas Traction Company of Fort Worth, spoke on the subject: "Telling the Utility Story Through Utility Employees." He asserted that one member out of every twenty families in Texas is employed by a public utility, and pointed out that this fact affords great possibilities for spreading the message of the utilities among the people. He said that if utilities will take advantage of this fact the problem will be an easy one. He suggested that vocational education of employees will greatly increase the value of employees for improving public relations and will give them a better insight into their problems.

E. D. Shurter of the University of Texas and head of the American Citizenship League of Dallas declared that speakers in the schools of Texas offer an excellent avenue to spread information on the operation of public utilities and to improve public relations.

Earl H. Hodges, director of the Arkansas Public Service Information Bureau of Little Rock, in an address said that one man on a Little Rock car line makes it an absolute rule to say "good morning" to every person getting on the street car. Mr. Hodges said he found it a little boresome himself, but it is a big hit with the general public. To the average man this conductor is the company and the company is judged by him. It is important to impress people with the fact that utilities have the interest of the state at heart and desire to assist in developing it. It is important to carry out the idea that the company is interested in development as well as in dividends.

Standardization and the Purchasing Agent

AT THE meeting of the National Association of Purchasing Agents, held in Cleveland during the middle week of May, a paper on the effect of standardization on the work of the purchasing agent was read by Dr. P. G. Agnew, secretary, American Engineering Standards Committee. He claimed that hundreds of millions of dollars could be saved annually by municipal and state governments and by the industries of this country through the unification and standardization of purchase specifications. He pointed out that industrial standardization means to single out specific products and materials, to settle upon their properties and dimensions, and to concentrate upon them in production and in use, all to the end of bringing about the greatest over-all industrial effieciency possible.

This standardization involves (1) nomenclature; (2) purchase specifications; (3) methods of tests; (4) uniformity in dimensions necessary to secure interchangeability of supplies and the interworking of apparatus and of parts; (5) provisions for safety; (6) concentration upon the best number of types, sizes and grades of manufactured products.

American Association News

Executive Committee

THE executive committee of the American Electric Railway Association met in New York on May 25. The attendance was comparatively small. Those present were President C. D. Emmons, W. H. Sawyer, C. E. Morgan, J. H. Hanna, J. N. Shanahan, L. S. Storrs, R. P. Stevens, J. H. Pardee, C. L. Henry, C. R. Ellicott, E. P. Waller, A. A. Hale, Barron G. Collier; Mr. Haskell, representing S. W. Curwen and Executive Secretary J. W. Welsh.

Mr. Sawyer, reporting for the membership committee, pointed out that there are a large number of companies which are receiving the benefits of the Association through the membership of an affiliated company, without paying any dues. This resulted in a good deal of discussion as to whether this situation should be permitted to continue and how best to correct it. On motion the membership committee was directed to study this problem and recommend some definite basis of treating the question of dues of affiliated companies, possibly looking toward an amendment of the constitution if necessary.

President Emmons suggested the personnel for the committee on nominations and the executive committee gave its approval. J. H. Pardee will serve as chairman of this committee. The other members will be announced later.

The committee discussed the advisability of indorsing the work of the National Transportation Institute. As further information was desired as to the purposes, the cost to members, and whether it meant duplication of effort, action was deferred until the next meeting of the executive committee. Meantime President Emmons and Mr. Storrs will investigate and report.

Application for membership in the association was approved for the following railway and manufacturer companies: Alabama Power Company, Birmingham, Ala.; Cumberland Traction Company, Bridgeton, N. J.; Chicago & West Towns Railway Company, Oak Park, Ill.; T. H. Symington Company, New York; Yellow Coach Manufacturing Company, Chicago.

The next meeting of the committee will be held at New York on Friday July 13.

Entertainment Committee Appointed

PRESIDENT C. D. EMMONS has appointed the following men to serve on the entertainment committee for the annual convention of the American Electric Railway Association in October:

J. C. McQuiston, manager department of publicity, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., chairman; L. H. Palmer, general manager United Railways & Electric Company, Baltimore, vice-chairman; J. H. Hanna, Washington; C. H. Beck, New York; E. F. Wickwire, Mansfield, Ohio; F. D. Burpee, Ottawa, Canada; Martin Schreiber, Camden, N. J.; George R. Lyman, New York; J. P. Barnes, Louisville; J. V. Sullivan, Chicago; William Arthur, New Haven, Conn.; E. C. Faber, Chicago; K. A. Simmon, East Pittsburgh; C. C. Pierce, Boston; Harry L. Brown, New York; H. Fort Flowers, Findlay, Ohio; J. S. Bleecker, Springfield, Ohio; E. P. Waller, Schenectady, and Harold Hegeman, New York.

Equipment Committee Puts Finishing Touches on Year's Work

A MEETING of the committee on equipment of the American Association was held in New York City on May 17 and 18. Those present were F. H. Miller, Louisville, Ky., chairman; Walter S. Adams, Philadelphia, Pa.; L. J. Davis, Brooklyn, N. Y.; Charles Gordon, Chicago, Ill.; J. L. Gould, Wilmington, Del.; A. J. Miller, Ramapo, N. Y.; M. O'Brien, St. Louis, Mo.; E. D. Priest, Schenectady, N. Y.; E. S. Sawtelle, Cincinnati, Ohio; P. V. C. See, Akron, Ohio, and C. W. Squier, New York, N. Y. C. Bethel and W. H. Phillips, Pittsburgh, Pa., represented J. M. Hipple.

The several sub-committees submitted their final reports, the extensiveness of which showed that much work had been accomplished during the past year. The sub-committee on gearing presented a tabulation of answers received through a questionnaire, together with further recommendations for submitting data regarding the standardization of web holes in gears.

The sub-committee on trolley contact devices also is tabulating data received from a questionnaire. These will be added to the data collected during previous years.

A third sub-committee reported activity in reviewing existing standards. All the standards and specifications relating to equipment have been gone over very thoroughly and recommendations were made for bringing these up to date so as to correspond with specifications of the American Society for Testing Materials and of the American Railway Association. The sections relating to miscellaneous methods and practices involving equipment had been studied carefully and submitted to manufacturers for criticism. As these appear to be out of place in the permanent form of manual now contemplated the equipment committee's recommendation to the committee on revision of the manual is that they be omitted from the bound volume.

The study of spring supports for railway motors which has been under consideration by a fourth sub-committee has proved interesting. Much information has been collected and several recommendations for general use will be submitted, which should aid materially in overcoming difficulties experienced from various motor supports.

Recommendations for standard designs of dust guards were submitted by another sub-committee. These are in shape for final report.

This was the final meeting of the equipment committee before the convention.

Significant Conference on Education

AT THE invitation of Chairman Edward Dana of the American Association committee on education, several representatives of member companies met with the committee in New York City on May 11. The purposes of the meeting were to block out the report of the committee preparatory to its completion by a sub-committee, and to secure toward this end the experience of companies which have been active in educational work.

The morning session of the committee was occupied with accounts of recent actual experiences. F. J. Gannon, Fort Worth, Tex., told of the foremanship class held in that city last year under the State Board of Vocational Education. Shop courses are also conducted. Instructors are sent to Austin for training. Similar classes are held in Houston, Dallas and El Paso.

J. F. Hyatt, Highwood, Ill., described the work which has been done on the Chicago, North Shore & Milwaukee property. This company got into its

educational activities during the war through its Americanization program for track men. It has now developed until one man is employed to give his whole time to the work and an extensive program is in operation. An interesting feature is that there are now four classes in public speaking at the expense of the men. H. O. Allison, New Brighton, Pa., said that the Beaver Valley Traction Company has two schools in operation. In one a course of thirty-six lessons dealing with everyday subjects is given, and in the other home problems are dealt with.

N. E. Stubbs, Baltimore, Md., stated that the United Railways & Electric Company co-operates with the Johns Hopkins University and other institutions in providing instructions for employees, of whom 250 are doing some school work. The company pays one-half of the fees on completion of the courses. A business course at J.H.U. costs $20 and a technical course $40.

These notes will serve to indicate the general tenor of the discussion, which was participated in by all of the committee members and visitors present. Besides those mentioned, there were in attendance the following: George A. Barnes, New York City; C. R. Ellicott, New York City; H. H. Norris, New York City; M. B. Lambert, Pittsburgh, Pa.; C. E. Morgan, Brooklyn, N. Y.; James McFall, Connellsville, Pa.; C. F. Schmidt, Indianapolis, Ind.; C. P. Rexford, New Bedford, Mass.; A. M. Robinson, Philadelphia, Pa., and W. H. Timbie, Boston, Mass.

Specifications for Air Reservoirs

A MEETING of the Engineering Association committee on specifications for non-fired pressure vessels was held in New York City on May 17 with a 100 per cent attendance of the committee, namely, R. H. Dalgleish, Washington, D. C., chairman; L. J. Davis, Brooklyn; and J. A. Leefer, Pittsburgh, Pa.

A preliminary specification was discussed by the committee. This had been previously sent to a number of the equipment men for consideration and, as the committee on equipment was in session while the pressure-vessel committee was holding its meeting, the specification was submitted to the equipment committee. It was decided that after recommended changes had been made, the specification will again be submitted to the equipment committee.

It was stated that while the boiler code committee of the A.S.M.E. has not yet completed its investigation in this field, it is understood that the committee will consider acceptable those tanks in which the longitudinal seam has been welded. This decision is consequent upon an extensive test of seam-welded tanks made by the United States Bureau of Standards in February. The Engineering Association committee was of the opinion that it should recommend tanks with longitudinal seams either welded or riveted.

The question of enameling the interior of the tank was discussed, and it was decided that the specification should cover both enameling and galvanizing.

Power Distribution

A TWO-DAY meeting of the power distribution committee of the Engineering Association was held in New York, May 21 and 22. Members present were M. B. Rosevear, chairman; J. W. Allen, L. W. Birch, H. G. Burd, R. W. Eaton, C. L. Hancock, C. R. Harte, sponsor, H. D. Hawks, C. J. Hixson, A. Hughes, Jr., C. H. Jones, H. S. Murphy, W. Schaake and F. J. White.

Mr. Hughes, chairman of the subcommittee on revision of the power distribution sections of the engineering manual, reported that it is desirable to get incorporated in the revision of the manual any changes that are to be made. Certain of the sections can be included as they stand.

The section covering specifications for sherardizing or galvanizing line material has been referred to the A.E.S.C., which plans a conference of manufacturers to determine if an American standard for galvanizing and sherardizing should be formulated. Mr. Hixson said that there is a great difference of opinion among the manufacturers and users as to the methods of protection in general, and that some standardization should be made on this point also. Several other specifications are now referred to the A.E.S.C. for action leading to adoption of American standards.

The section on clearances for overhead working conductors has been referred to the heavy electric traction committee.

The 600-volt overhead trolley construction section of the manual has been submitted to the A.E.S.C. This is a contruction specification only and does not include materials, which are covered in other specifications. Some changes were recommended. There was some discussion on the subject of ground sleeves for tubular steel poles. In cases where they are used it was felt that they should be beveled at the top joint to assist drainage. Also, the poles should be set so that the sleeves will extend at least 12 in. above the ground.

It was the sense of the meeting that the sections on signaling, which cover signal aspects, can be combined and simplified to some extent, and that the section on car registering signals can be simplified materially, and also modified to conform to standard practice.

The sub-committee on catenary construction, Mr. Jones, chairman, reported on a specification which includes the location of trolley wire on curves.

Mr. Murphy, chairman of the subcommittee on trolley wire wear and specifications, read the preliminary draft of a report covering a study of the composition and relative wear of trolley wire which has been made, looking toward a joint specification for hard-drawn trolley wire. This subcommittee reports that it has virtually reached an agreement with the similar sub-committee of the A.S.T.M., thus making the trolley wire specifications of the two associations uniform. The sub-committee hopes that this action will be ratified by both associations at their next annual meetings. In this connection it was decided to recommend to the executive committee that a research be conducted to determine the extent to which various factors influence the wear of trolley wire. It was felt that the problem is intimately connected both with the design of the overhead and of the collecting device, and that any study to be made should include these factors.

It was also decided to request that a test be made of trolley wire wear in connection with the test of rail joints now being arranged for.

It was the sense of the meeting to recommend that work on signals, which has been under this committee for several years, be placed under an independent standing committee at the next convention. This will permit of more attention being paid to the work of other associations dealing with signaling.

Suggestions were made that, in addition to the subjects already before the committee, concrete poles and rail-joint bonding be added for next year's program.

Committee activities of the A.E.S.C. regarding wire and cable specifications were reported on by Mr. White, who is secretary of the sectional committee. He gave a brief progress report on the work of the twelve technical committees handling this work in the A.E.S.C.

Mr. Harte reported on the status of the sections of the manual relative to wood and other poles.

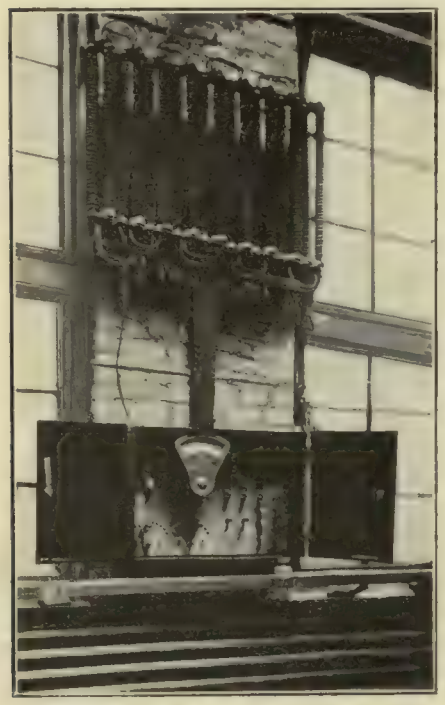
Accident Prevention

The committee on accident prevention of the Transportation & Traffic Association held a meeting in New York on May 18-19. Those present were: H. B. Potter, chairman; M. W. Bridges, A. W. Koehler, E. M. Walker and H. Restofski of the T. & T. committee, together with H. O. Allison, chairman of the corresponding committee for the Claims Association. The meeting was taken up principally with a discussion of the returns from a questionnaire sent out to member companies. Replies have been received from 110 companies in the United States and Canada, representing thirty-eight states. The tabulated returns give a comparison of reasons for accidents. These have been well analyzed, and form a basis for a better organization of work in accident prevention. The returns also indicate that despite increasing street traffic, the situation regarding accidents is more encouraging than it has been in the past. The data collected will form a part of the final report to be presented at the October convention.

Maintenance of Equipment

Testing M-U Control Under Service Voltage Conditions

FAILURES in the control mechanism on cars equipped with multiple-unit control, such as the turret type or the switch group type, are often caused by the decrease in line voltage as the train approaches a feeder end. The control may "notch up" in a satisfactory manner under inspection, as the line voltage may be high in the shop due to its location near the source of power. However, at terminals, which are often single-end fed, the voltage may drop off as much as 40 per cent. The operating mechanism, such as the pistons and valves of an electro-pneumatic control apparatus, will not function properly under these low-voltage conditions, and such inoperation may cause considerable delay.



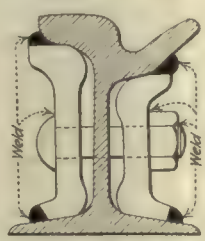
Apparatus for Producing Various Line Voltages

A testing outfit to reproduce various line voltages has been installed in the shops of the Northwestern Elevated Railroad, Chicago. The apparatus was built in the company shops and consists of suitable resistance coils mounted on the wall, and a switch cabinet with slate panel on which is mounted a direct-reading voltmeter and knife switches, switch levers and contact points, and suitable fuses. The line current is carried through the apparatus and delivered to the collector, either shoe or trolley pole, at any voltage the control man may desire. The voltmeter gives him directly the voltage condition under which he is testing the control mechanism. Adjustment of the mechanism is then made so that it will function properly under voltage conditions worse than those experienced on the road.

Since the installation of this apparatus no failures from faulty control mechanism have occurred on the cars served by this particular shop.

Large Seam Section for Welded Joints

THE joint plates used by the Lehigh Valley Transit Company for repairs to 96-lb. and 116-lb. grooved girder rail are cast in its own steel foundry. In order to give an ample cross-section for the weld along the seam a plate similar to that used by the Third Avenue Railway System, New York City, is used. This was described in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 18, 1922, page 808.



Cross-Section of Rail Joint Showing Provision for Insuring Large Section of Welding Metal

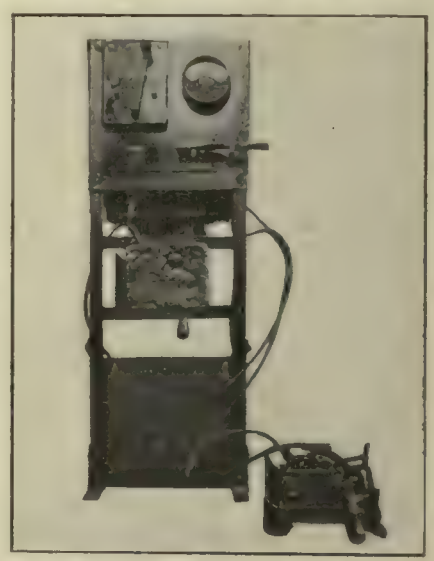


Completed Welded Joints as Installed by Lehigh Valley Transit Company

The outside portion of the joint plates projects outside the railhead so as to provide a V-shaped groove for the welding metal. The bottom of the plate is shaped so as to permit the laying of the seam weld back at the edge of the rail base. The bolts used to hold the plates in position during the welding are welded around the heads, and the nuts are welded at the contact surface and also at the thread.

Circuit Breakers Tested Under Low Voltage

CAR circuit breakers are calibrated and tested according to the number of amperes at which they will open. Hence, they can be tested just as easily with low voltage as with high. Nevertheless, the trolley voltage is usually employed, because that is available and a lower voltage is not.



Circuit Breakers Are Tested with Storage Battery Current by This Board

The Cleveland Railway, which has been a pioneer in many directions, conceived the idea, or at least Terence Scullin, master mechanic of the company, did, of testing circuit breakers with 6 volts, and that is the voltage used at the Harvard Avenue shops of the company. The accompanying line drawing and half-tone show the construction of the circuit-breaker testing outfit.

The current used for testing is obtained from a 6-volt storage battery, type MVS-21, made by the Electric Storage Battery Company. Other parts of the testing equipment con-

sist of a circuit breaker set at the maximum limit of 500 amp., suitable resistance grids, a four-point control switch, a 500-amp. meter and a single-blade knife switch.

This low-voltage testing outfit has several advantages besides the one that very little power is used by it. The principal one is that as there is no danger of shock or flash, the test is easy to carry out, and it is done

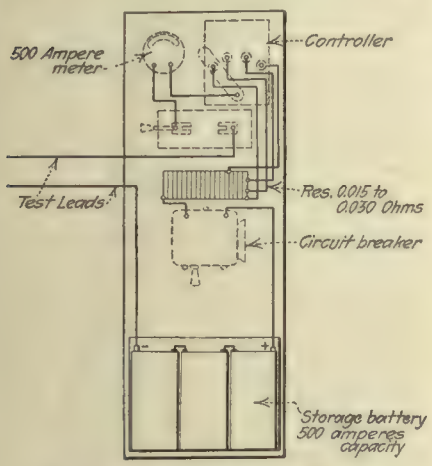


Diagram of 6-Volt Circuit-Breaker Testing Board

at Cleveland at the repair bench. Then if any defects, such as short-circuited magnet coils, poor contacts, excessive friction or other trouble are discovered, they can be corrected before the breakers leave the repair bench.

It has been found necessary to recharge the batteries only about every three weeks.

After being tested at the repair bench in this way, car circuit breakers are also tested under 500 volts on the car. This is done in the car yard on a special section of trolley wire which is fed through a circuit breaker calibrated to about 350 amp. The motors on the car are cut out and the current is put through resistances on the car.

Interlocking Door Operation with Control

TO PROVIDE for interlocking the operation of the doors with that of the control equipment, so that cars cannot be started until all doors are closed, the Lehigh Valley Transit Company, Allentown, Pa., makes use of the following attachments.

On the company's center entrance type of car there are four doors with operating shafts. Fiber drums with necessary copper contacts are installed at the bottom of these door-operating shafts, and a finger block with two fingers makes the necessary contact for the opening and closing circuits. With the doors closed, the circuit is connected in series with the line switch operating wire, so that the advancing of the controller handle will then energize the coil of the line switch and bring this in.

In regular operation the controller handle can be placed on its first operating notch, and the closing of the doors will then close the circuit to the line switch, so that this will be brought in as soon as the doors are closed.

Reducing Armature Failures Over 50 per Cent

BY JOHN S. DEAN
Westinghouse Electric & Manufacturing Company

AN EXAMPLE of what can be accomplished by dipping and baking railway motor armatures is furnished by the experience of one city railway property located in a section of the United States where the average monthly precipitation of rain and snow is approximately 4 in. This railway operates 1,800 railway motors, of which 70 per cent are of the non-commutating-pole type and have been in service for many years. Due to the age of the equipment, an increasing number of yearly armature failures here would naturally be expected. However, this company has noticeably reduced its motor failures since 1919, when it began to dip and bake the armatures. The record is shown by the following tabulation:

Year	Average Armature Failures per Month	Per Cent Reduction in Failures
1919	67	..
1920	38	44
1921	26	61
1922	24	64

In this work a Westinghouse type R3 electrically heated oven is used. It is fitted with thirty type C heaters with a total power consumption of 69 kw. at 550 volts. With the present facilities approximately fifty armatures can be treated per week. The whole operation of dipping armatures, loading and unloading the trucks and taking care of the oven is handled by one man. It is estimated that about 1½ gal. of varnish is used for each armature. The approximate cost to remove an armature from the car and to replace it with another, and to dip and bake it, including labor, material and power to heat the oven, is between $6 and $7.

The master mechanic on this property feels that this expense is justified, and he estimates it will prolong the life of his armatures approximately five years. One noticeable fact in this connection is that the pile of bad-order armatures on the armature room floor has been reduced from an average of fifty to ten or less, and the pull-ins from service due to armature troubles have also decreased very noticeably.



One Man Cares for Dipping and Baking With This Oven

Sectionalizing Overhead Special Work

By G. H. McKelway
Distribution Engineer Brooklyn Rapid Transit Company

MANY railways are opposed to cutting section insulators into the trolley wire on curves. Conditions frequently occur, however, at intersections where it is desirable to connect the lines physically by connecting curves and still keep them apart electrically. Section insulators must then be cut into the wire on the curve, or they must be cut in on one of the lines extending either side of the intersection but far enough away to be outside the frogs, so that the special work, including the through wires on both lines, can be fed from a single feeder. With this construction, if the feeder is killed for any reason, the whole of the special work is dead and cars on both lines are tied up unless it is possible to coast across the dead section on the line whose feeder is alive. This may be possible in some instances, but generally the first intimation that a motorman has that the intersection is dead is when his car runs onto it and becomes stalled. Even if the crossing is unobstructed it is often dangerous to coast across a busy intersection at high speed unless there is a traffic officer present, or some one who can control passing vehicles while the car is moving across the dead portion.

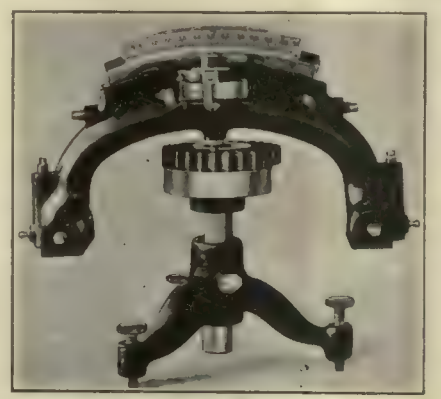
The intersection can be kept alive by installing a double-throw switch to connect either of the two feeders to the trolley on the intersection, and also installing section insulators in the two trolley wires on all sides of the intersection. This arrangement makes a separate section of the intersection and allows the special work to be fed from the feeder of either of the two lines. While such an arrangement is entirely practical, it is not often installed because it is rather expensive and the maintenance of two section insulators in each wire is also troublesome. Its best use is at points of heavy traffic.

In most cases, however, the simple cutting of an insulator into the trolley wire of the curve will be found to be entirely satisfactory and will be much cheaper. Where most of the traffic is straight through the special work, there is seldom any excuse for installing either of the other schemes, as the insulator in the curve will give no trouble. Of course, trolley wheels will follow a smooth trolley wire, in which there are no breaks, more easily than any combination of the wire and something else, but the number of wheels that will leave at the section insulator will be negligible if the insulator is properly installed and maintained.

New Equipment Available

Novel Device for Testing Hardness

EDWARD G. HERBERT, Ltd., Manchester, England, has just placed on the market the Herbert pendulum hardness tester. The instrument is shown in the accompanying illustration placed so as to test the hardness of a milling cutter which is mounted on a tripod stand. It consists of a pendulum, of the peculiar form shown, which rocks on a ball of steel or ruby 1 mm. in diameter, held in a chuck in the center. Six screwed weights are provided whereby the position of the center of gravity of the whole instrument may be adjusted to coincide with the center of the ball or otherwise. The center of gravity being at the center of the ball, the instrument is in neutral equilibrium when supported by the ball on a hard level surface; that is, it tends to remain in any position in which it may be placed. For standard tests the center of gravity of the instrument is lowered until it is 0.1 mm. below the center of the ball, when the time of a single swing on a very hard surface is ten seconds. The swing of the pendulum is indicated by means of a bubble in a curved glass tube, attached centrally to the top of the instrument, and a curved scale mounted over the tube and graduated from 0 to 100.



A Hardness Tester in Which the Measurement Is Made by the Time or Amplitude of Oscillation of a Pendulum

This instrument provides two means for testing the hardness of a material: (1) By the arc through which the pendulum swings when it is released from a position in which the bubble stands at zero. On glass, this, as indicated by the bubble scale, is 97; on tempered high-speed steel it is 75, and on annealed carbon steel it is 41. (2) By the time of a single swing of the pendulum. On a very hard surface this is ten seconds; on hard steel it is from five to eight and one-half seconds, and on soft steels from two to four seconds. The time test is recommended.

The fundamental principles involved in these two hardness tests are these: (1) When the pendulum is deflected to the end of the swing and released, the ball rolls out or elongates the slight indentation made in the surface of the material under test. The energy absorbed in thus displacing the metal is taken from the potential energy of the pendulum as is shown by a shortening of its first swing. This gives the basis for what are known as the "scale" tests. (2) The time of oscillation is related to the hardness of the material because when the ball indents the surface the length of the pendulum is shortened and the time is correspondingly shortened in accordance with the law of the compound pendulum; that is, the time is inversely proportional to the square root of the length of pendulum. Obviously, as the full length of the pendulum in this case is only 0.1 mm., a slight indentation serves to affect the length considerably.

An empirical relationship between the time-test scale and the Brinell hardness scale has been established experimentally

Triplex Ammeter for 3-Phase Circuits

THE Roller-Smith Company, New York, N. Y., has brought out a new type of ammeter which permits the simultaneous reading of the current in the three phases of a three-phase circuit. The ammeter mechanisms are independent, but are all mounted in one case 7½ in. in diameter. Each mechanism has a capacity of 5 amp. and its scale is marked according to the ratio of the current transformer to which it is connected. The mechanisms are of the electromagnet type, with an air-damping scheme.

The News of the Industry

Improvement Program Planned

Georgia Railway Files Petition Promising Railway Betterments, Organization of Bus Service and Increased Ticket Sales

WITH the idea in mind of furnishing Atlanta with better, safe, quicker and more extensive electric railway service the Georgia Railway & Power Company on May 11 filed a petition with the Mayor for presentation to the City Council outlining a constructive plan for the solution of the city's present traffic problems and its future transportation needs. The company makes a strong plea for the co-operation of the city and the public in helping it to attain its ambitions — to provide transportation service to 500,000 people—a goal toward which all residents of Atlanta are working.

The program submitted for enlarging the service includes improvements to the electric railway system, organization of a bus system to supplement the street railroad and increased sale and use of tickets.

The improvements to the railway system embrace general improvement in track, cars and the electric system, the speeding up of cars and a general improvement in service as a basis for increased travel. The company states in its petition that before launching the proposed program of increased service it succeeded in providing more than $1,300,000 for general improvements during 1923, but could not succeed in securing any money for extensions. This work is now going on.

Because of the fact that it will be many years before the company can extend its service by building tracks in developing areas the plan seems feasible to provide motor bus transportation. It, therefore, is the intention of the company to provide a responsible, dependable service backed by ample capital and thoroughly regulated. A coordinated system is what is proposed which will bring bus transportation under the existing laws regulating electric railway service as to schedules, fares and routes. This, in the opinion of the company, is the only way that the public can get any benefit from such service.

Instead of selling fifteen tickets for $1 the plan is to sell three tickets for 20 cents, or multiples thereof. The idea back of this plan is to increase the sale of tickets, thereby eliminating some of the delays caused by the fact that at present most of the car riders pay cash fare and the loading of cars is delayed in making change. Increased use of tickets will speed up the cars.

The company states that there are many conditions which definitely limit the company's ability to carry on and develop the public transportation service. These present handicaps include private and public automobiles, unregulated jitney competition, unnecessary congestion of the streets, lack of enforcement of traffic regulations and the greatly increased cost of both materials and labor.

The existence of these conditions means that the service being furnished is unprofitable. The company contended that the operating ratio has risen from a fraction more than 50 per cent in 1909 to more than 72 per cent in 1922. Under these circumstances the company claims it is impossible to make extensions no matter how much the communities need transportation. It is in order to correct these conditions that the company has prepared the constructive program just described.

In carrying out its proposed program the co-operation of the city is asked in the following two particulars:

1. Regulation of jitneys by vigorous enforcement of existing laws and the passage and enforcement of all regulations necessary to prevent unfair competition.

2. Traffic regulation.

With respect to the regulation of jitneys, the company in its petition states that it is unfair to permit jitneys, unregulated and untaxed, to compete with the public service company; that it is the duty of a community to protect its transportation agency when it has invited the investment of vast sums of money in providing that service. Further, that the city actually loses money through the operation of every jitney on the streets of Atlanta. The jitneys contribute nothing to the construction and upkeep of the streets, while the city gets $983 every year from every street car operated. It is further charged that the jitney contributes to a considerable extent to the congestion on the streets.

On the subject of traffic regulation, the petition states that 250,000 passengers who use the electric railway cars daily are being subjected to ever-increasing delays owing to the fact that proper regulation of traffic is not enforced. It recommends the adoption of all necessary additional laws to relieve this congestion on the downtown streets. Further, that the individual must be convinced that it is to his personal interest to observe strictly the traffic ordinances because they save his time whether he uses an automobile, a truck or a street car.

Municipal Ownership Advocate Elected in Denver

Ben F. Stapleton, former postmaster of Denver and candidate of Governor William E. Sweet of Colorado, was elected Mayor of Denver on May 15 in one of the most bitterly contested elections ever held in Colorado. Governor Sweet openly announced that he would not back a candidate who did not favor municipal ownership of utilities.

Of the seven candidates in the race, all but two, Mr. Stapleton and D. C. Bailey, who was defeated for re-election, expressed themselves unequivocally on this point. The other candidates, however, harped on the issue as a subject of widespread interest.

Decision as to possible municipal ownership will probably be made during the term of the recently elected Mayor and this accounts for the subject being injected into the spring campaign. Mr. Bailey openly opposed the idea of municipal ownership.

Mayor-elect Stapleton's platform on the subject of public utilities as advertised prior to the election provided:

> The Mayor should make known to the public the facts as to the value and cost of operations of the tramway and gas and electric properties. Our home rule charter requires the submission of all questions of ownership and franchise to the people for final decision. The duty of the city administration is to carry into effect intelligently the mandates thus expressed.

The agitation for municipal ownership which has now resulted in the election of Mr. Stapleton to office is generally credited as being largely the result of the aftermath of bitterness and misunderstanding growing out of the Denver Tramway strike of 1920.

Ten Per Cent Wage Increase in Toledo

In a new wage contract which became effective on May 22 the platform men of the Community Traction Company, Toledo, will receive a wage increase of approximately 10 per cent. The entire boost will raise the operating expense of the company, about $13,000 a month.

From a scale of 45 cents for the first three months, 47 cents for the ensuing nine months, and 50 cents an hour thereafter the scale has been boosted to 50, 52 and 55 cents for the same periods of service. The scale was agreed upon after a four-day conference participated in by representatives of the company and the men. The men had asked rates of 60 and 65 cents. Shop men received a corresponding wage increase.

Increase of Five Cents

Arbitration Board on Wages of Cleveland Railway Employees Finds Sixty Cents Maximum

As was announced in the ELECTRIC RAILWAY JOURNAL of May 5, wages of motormen and conductors of the Cleveland Railway were increased 5 cents an hour beginning May 1. The decision, which was the result of arbitration, fixes the scale at 55 cents for the first three months, 58 for the next nine months and 60 cents at the end of the first year. The men had sought an advance amounting to 15 cents an hour.

In fixing the wage award the board of arbitration took into consideration two methods, one of which was termed relative based on the history of increases in the cost of living, of wages, etc., and the other absolute, based on present and future conditions and actual costs of living.

EMPLOYEES MADE A FAVORABLE IMPRESSION ON BOARD

It was brought out that 2,750 trainmen were employed by the company, of whom 2,060 were regulars and 690 extra men. The board characterized the men in general as clean cut, efficient, courteous and careful in their personal habits. Further, that the men worked under favorable surroundings while on the road. But there were hardships to take into consideration, namely, the irregular and unusual hours and the working on Sundays and holidays.

The board prepared a table compiled almost exclusively by using the figures quoted in Arthur Sturges' exhibits submitted in behalf of the union beginning with May 1, 1918, and ending with May 1, 1924. In determining the wage scales set forth therein studies were used that were made from time to time by the United States Bureau of Labor Statistics and founded on 1918 actual expenses of actual families. These were submitted as the only authoritative data on the cost of living in Cleveland. To the table the board added an estimated index for March, 1923, of 173.4, assuming thereby that the cost of living had increased three points since December. It was remarked that since this estimate was made the financial editor of the *Iron Trade Review* was quoted as saying that the cost of living was 59 per cent only above 1914 according to the index of the National Industrial Conference Board.

Summing up the tables, the results were that, if based only on relative increased cost of living, the maximum decision of the board for the ensuing year should be 52 cents; that if it is assumed that the wages were lower than necessary to the extent of 10 per cent, which is really when analyzed, the position that the men took in 1918 and in 1919, the wage scale for the next year should be 57.1 cents. But the board went further and calculated that if it were to adopt the wage scale which most closely approximated the history of the past, namely, the one that assumed an addition of 15 per cent to the bare cost of living, the rate would be 59.8 cents. The last rate to be considered, assuming a 19.1 per cent increase over and above the cost of living, is 61.9 cents.

The board also took into consideration the fact that in 1919, considered as the boom year, the men secured their maximum demands, namely, 60 cents, and in that year the cost of living was considerably higher than it was now, according to everybody's testimony. The board said that the maximum wage in 1923 should be 60.5 cents. This figure was arrived at by consulting the trend from month to month of the average pay-roll earnings of nearly 2,000,000 employees in forty-three industries, according to the Bureau of Labor Statistics and taking into consideration the average of May and June, 1920, as the standard.

In making its decision the board considered the various standards which were submitted by way of budgets. Among them was that of $1,661 submitted by Arthur Sturges, which was a compilation of the expenses of 245 families in Cleveland by the Bureau of Labor Statistics, 180 of which families saved money on that income and sixty-two had a deficit. It was also brought out that a considerable percentage of the railroad men, especially of the extras who were working for $3.30 a day, must be unmarried. The board reconciled these budgets with a proposed budget for a single man, and taking the figures submitted to the effect that the average day's work was eight and one-half hours and assuming 313 working days, a maximum rate was arrived at somewhat less than 60 cents.

The board in conclusion recommended the improvement of working conditions, especially the abolition of the runs whose spread was more than eighteen hours.

MEN'S REPRESENTATIVE DECLARES AWARD UNFAIR

The award was approved by Judge Fielder Sanders, former City Street Railway Commission, and Thomas P. Schmidt, representing the company. Judge Frederick Walther, representing the men, dissented from the award of 55, 58 and 60 cents on the ground that he could not agree that that rate constituted a fair living wage. He said that in his opinion the American standard of living required that not only should a man be entitled to a decent living wage, but that he should be permitted to earn such wages without being compelled to work seven days each week, and that every man is entitled to have at least one out of seven free from being compelled to work at his usual labor. Further, his own budget of $1,763 for a family consisting of husband, wife and three children would not provide for savings, old age or any luxuries.

He further argued in his statement that it was the very great exception when any trainman actually puts in his eight and one-half hours in straight time. It was his contention that the testimony before the board of arbitrators showed that with the exception of opportunities for regular runs as a result of new lines and additions to the service, a motorman or conductor is frequently compelled to serve as long as eight years before he obtains a regular run. During a large part of this time he "bucks the list." He said that he was both unwilling and unable to subscribe to a rate of wage which he considered entirely inadequate.

Pittsburgh Employees Receive Increase of Seven Cents

After negotiations lasting six weeks officials and employees of the Pittsburgh Railways entered into a compromise agreement on May 22 whereby the men will receive an increase of 7 cents an hour effective May 1. The vote was 836 for acceptance and 667 for rejection with the alternative of arbitration between 60 cents an hour, the present rate, and 80 cents, which was the original demand of the carmen.

The new and old wages in cents per hour are as follows:

	New	Old
For the first three months.....	60	54
Next nine months.....	65	58
After the first year's service....	67	60

When the wage matter first came up for discussion the receivers offered 66 cents an hour maximum in answer to the carmen's demand for 80 cents an hour, but the employees rejected this offer by a vote of 2,177 to 9. The next step was the proposal advanced for arbitration of the matter between 66 and 74 cents an hour and later between 66 and 72 cents an hour. It is said the men wanted 70 cents an hour, which would have restored the old 1920-1921 wage schedule.

In the matter of working conditions a number of minor changes were obtained by the carmen. Under the new agreement the average length of day is eight hours and fifty-one minutes.

$1,000,000 Electrification Work to Proceed

Construction of the interurban line from Dallas to Denton, Tex., through electrification of the lines of the Missouri-Kansas-Texas Railroad by the owners of the Dallas (Tex.) Railway, is expected to begin by June 15, according to Richard Meriwether, vice-president and general manager of the Dallas Railway. This announcement was made following a decision by the State Supreme Court of Texas, in which the motion was denied that had been made for rehearing in the injunction proceedings brought in the District Court at Dallas and appealed through the courts to the court of last resort.

Surveys for the electrification of the line have already been made under the direction of B. R. Brown, chief engineer. The work is expected to cost about $1,000,000 and is to be completed within a year from the date that work is begun.

$4,000,000 Expenditure Before Public

Pershing Square Subway Franchise for Pacific Electric to Be Determined by Los Angeles Voters

Recently the Pacific Electric Railway applied to the City Council of Los Angeles for a subway franchise from Pershing Square westerly to First and Glendale Boulevard. The City Council on May 16 adopted a resolution to place the issue on the ballot for the election of June 5.

The City Attorney in passing on the matter states that the question of "easements or rights-of-way" offered the only possible obstacle to the construction of the proposed subway terminal under the city's park property. The city attorney further states that should the voters decide in favor of the construction of the subway under the park the action would possibly be sustained by the court.

The Pacific Electric Railway's plan calls for a series of subways branching from Pershing Square, with view of removing its interurban trains from the streets of Los Angeles. Its suggestion had the approval of the Community Development Association, Los Angeles Planning Commission, Los Angeles Traffic Commission, Los Angeles Chamber of Commerce and several other prominent associations interested in the traffic problem of the city. The company states that it is essential that an early decision be reached by the city in the matter of the franchise for the proposed Hollywood rapid transit subway; that is, whether the subway should end at the Hill Street terminal of the company or under Pershing Square. The railway, it is stated, has held up its plans to construct a subway to terminate at its Hill Street station pending a decision on an alternate plan to have the terminal underground at Pershing Square. The subway, for which the railway received a franchise sometime ago, will provide for rapid transit service to the Hollywood district as well as the San Fernando Valley territory. It will cost approximately $4,000,000. The alternate plan will make the Hollywood and San Fernando Valley subway a unit of a comprehensive subway system serving all parts of the city. It is stated that work on either one or the other plan will be commenced just as soon as the June election is over.

Following is the resolution placing the Pershing Square project on the ballot, as passed by the Los Angeles City Council:

Shall the City Council and the Board of Park Commissioners authorize and require the Pacific Electric Railway to construct and operate below the surface of Pershing Square certain subway tunnels and appurtenances, under plans to be approved by the city and so designed as to become a part of a general and comprehensive subway system; such authorization to be upon fair and reasonable terms for the protection of the city's needs; provided that such construction shall not interfere with the use of the surface thereof for park purposes, except for the necessary approaches to the subway?

The city's action in deciding to submit the issue to the people at the June 5 final municipal election was based on the city attorney's ruling that it is "feasible and proper" that the matter be put to a vote, as under the authority of the Los Angeles city charter, the city attorney held that the City Council and the park commission have authority to grant easements and rights-of-way to public utility corporations over public parks.

Immigration Restriction Permanent

Official circles in Washington favor establishment of the immigration quota on the 1890 basis. This arrangement would make it possible to draw immigration largely from the North of Europe. It is believed, however, that no matter what the basis may be that is finally decided upon, the restriction of immigration will be unquestionably permanent. Any relief from the present immigration law will come from a revision of the basis, and not by any general relinquishment of limitation. Public sentiment is strongly opposed to any large increase in immigration, since it has been learned that the public must take care of the unemployed in the off peak period, and, furthermore, because the capacity for assimilation is already taxed.

$4,000,000 Needed for Improvements

Manager for Receiver at St. Louis Sees Need for This Expenditure—Says New Franchise Should Be Passed in Interest of Company and Public

Invited to a meeting of a civic association in St. Louis recently to tell why extensions of car lines had not been built or when they would be built, Col. A. T. Perkins, manager for the receiver of United Railways, St. Louis, stated he hoped for and expected a decision in the valuation case by July 1, and that he is preparing a budget of proposed improvements to be presented to the reorganization committee. If he has anything to do with the property after it is reorganized he will ask for at least $4,000,000 to make service extensions.

Besides an adjustment of the valuation case by the Missouri Public Service Commission, necessary in order to get capital under a reorganization, Colonel Perkins said in his opinion the second requisite should be an entirely new franchise to run for fifty years, and so framed as to give the city the right of purchase. Existing franchises, he said, are complicated, and in many respects are not fair and just.

In the present situation, said Colonel Perkins, the proper thing to do is for the public to go into the matter of a franchise fully and fairly and decide upon a grant to permit healthy growth of the railways for years to come.

Just how much of their taxes the car riders desire shall be paid through the fare boxes is one of the points to be decided, and they should be fully advised as to the facts. The company last year paid more than $1,800,000 in straight taxes, plus $477,000 for paving. Almost eighteen and one-third mills from every car fare goes for taxes.

The management has built 101 motor cars and purchased fifty trailers and ten one-man cars. There are 100 more motor cars of the 700 type under construction in the company's shops. Seven new substations have been constructed.

The management of United Railways, said Colonel Perkins, is disposed to follow the plans of the City Plan Commission as far as possible in contemplating the building of new lines and the rerouting of old ones. Rerouting is greatly needed. The old constituent companies were in competition and the result was a duplication of service.

As to extensions, he explained that under the receivership the Federal Court permits the management to go as far as funds will permit in reconstruction work and to improve the property as it stands to take care of growing traffic, but for several reasons extensions are not possible until there is a reorganization. Bondholders and creditors from all parts of the country are ready to come into court at any time and oppose the spending of money which they think might affect their interests. So the court's order is that the property be conserved for the benefit of creditors pending reorganization.

There has been much loose talk about the pending valuation case, said Colonel Perkins. It has taken years of study to see what is in this enormous property. While the management does not expect to get a valuation within millions of the present reproduction cost, it does expect a fair figure from various standpoints. In the meantime, he added, the city's representatives should have worked in harmony with the management instead of setting up an arbitrary figure. If the city's figure were accepted, he declared, the property would be thrown into the courts and tied up for years with remote chances of extensions of service.

In a round-table discussion, a number of points relating to the transportation situation were brought out in answers to questions by members of the association, as follows:

Colonel Perkins was about to lease a number of buses some time ago to serve as feeders but was informed he could not do so under the Federal Court's general order. Under a reorganization he would favor the purchase of buses as one of the first moves to be made.

Most of the delays in service are caused by blockades in the congestions of downtown streets. There have been very few failures in car equipment.

Weekday traffic in January, February, March and April of this year has been heavier than in any other four months of the company's history, but Sunday travel is lighter probably on account of the increased use of the private automobile.

Baseball crowds are not profitable to street railways.

The zoo, in Forest Park, and the Missouri Botanical Garden are drawing the largest crowds, and a special loading station will soon be provided for the zoo.

A rainy day means a loss of from 50,000 to 200,000 passengers.

A reward of at least $1,000 would be paid by the United Railways to anybody who will invent a machine to dress paving blocks. This work is now done by hand.

One of the longest car rides in St. Louis without changing cars is on the Bellefontaine lines—16½ miles.

Experiments with the weekly pass system in other cities is being watched closely. Reports so far do not indicate much success.

Fares in St. Louis County should be readjusted because they are inequitable. On some lines passengers are paying for more than they get, and on others not enough.

Asked about municipal ownership, Colonel Perkins expressed the opinion that in view of Seattle's experience and the necessary restoration of a 10-cent cash fare, three tokens for 25 cents out there, St. Louis is not likely to favor this idea.

There are 20,000 citizens in the United Railways' family, he concluded, and they expect a fair deal from the people of St. Louis.

The Grand-Meramec Improvement Association gave Colonel Perkins a vote of thanks for his visit and speech.

Wage Situation Critical in Chicago

Indorsement of President Henry A. Blair's attitude on the demands for higher wages was made by the board of operation of the Chicago Surface Lines at a meeting held on May 23. Mr. Blair in a previous meeting with the representatives of the employees' union, Division 241 of the Amalgamated, had pleaded inability to pay the increase of 10 cents an hour over the present wage scale of 65, 68, and 70 cents, unless an increase in revenue is obtained. With this endorsement by the board there is little chance of a wage increase. The wage scale has lately become the principal issue under discussion, with the other two original demands, namely, one day a week off with pay and elimination of one-man car operation, receiving little or no consideration. The stand taken by the board was communicated to the representatives of the union at a meeting held on May 25. They will in turn present the decision to the men at a special meeting to be called on May 28.

Representatives of the unions have asked the Governor to use his influence with the Illinois Commerce Commission to urge it to recommend an increase in rates of fare for the Surface Lines in order that the company may meet their wage demands.

A meeting between Mr. Blair and Mayor Dever was held on May 24, which resulted in the appointment of a committee to thrash out the controversy before a strike is called. The success attained by a similar committee last year in abatement of the strike after it was called led the Mayor to make the appointment in anticipation of the strike this year.

A conference held on May 22 between Britton I. Budd, president Chicago Elevated Railways, and officials of Division 303 developed a dead-lock which might have broken off negotiations entirely, but for the hope that some outside influence to provide the company with increased revenue would develop. Mr. Budd had informed the representative that the company could not meet the 10 cents an hour wage increase without an increase in fares. Negotiations will, however, be continued at a meeting to be held on May 29, at which time the attitude of the men as voiced at their meeting on May 26 will be represented.

Schenectady Railway Enjoins City

Secures Temporary Order Restraining Mayor from Enforcing His Dictum Directing Non-Operation of Cars

The Schenectady Railway on May 18 obtained a sweeping injunction order from Supreme Court Justice Edward M. Angell of the Fourth Judicial District compelling the city to appear in the Supreme Court at Hudson Falls on June 9 and show cause why it should not be permanently restrained from enforcing Mayor Whitmyer's dictum directing non-operation of cars during strike. When on the following day George B. Smith, Schenectady counsel, in special term before Justice Edward M. Angell moved for modification of the injunction order it was denied.

The original order restrains the city from interfering in any way with the Schenectady Railway in its efforts to operate cars during a strike of its employees. Mr. Smith told the court the order virtually prevented police officers from maintaining peace and order and enjoined them from doing their sworn duty.

In connection with these moves it should be recalled that just before the strike vote was taken John E. Cole, Commissioner of Public Safety, told the men that in the event of a strike the cars would be kept in the carhouses. The city administration has been openly sympathetic with the strikers.

State Industrial Commissioner Bernard L. Shientag telegraphed from New York to Harry B. Weatherwax saying that unless satisfactory adjustment, temporary or otherwise, of the street railway strike is reached before Tuesday afternoon he would hold a public inquiry as to the cause of the strike pursuant to the provisions of the labor low. Mr. Weatherwax replied that he had determined upon a definite time for resuming operation, but that he did not propose to give out that information.

Mr. Weatherwax reiterated his willingness to arbitrate with all of the men, but not with the union. He denied that he was opposed to the principles of collective bargaining, but asserted he was opposed to the leadership of the union.

On May 21 100 strike breakers arrived in Schenectady and were quartered in the Fuller Street carhouse. The same day the city engineer submitted a report to the Common Council designating practically every street over which the railway operates in the city to make paving repairs. Under the law unless the company undertakes the work within thirty days after being notified so to do the city itself can perform the work and charge it to the company. The railway company operates about 25 track-miles in the city. Figuring on a basis of $12 per lineal foot for concrete ballast, this would mean an expenditure of about $1,500,000 for paving repairs.

A plan advanced on May 23 by a citizen's committee would reinstate all "men on strike" in their former positions as of May 16; representatives of the company and a committee of the men to formulate rules, fix wages and working conditions for the ensuing year, meeting within ten days after the resumption of operation. The operatives voted to accept a compromise offer if the old working contract would be included in arbitration, the opening paragraph of which reads: "This agreement shall be entered into between the Schenectady Railway and Local Division 576 of the Amalgamated Association."

This interpretation Mr. Weatherwax declined to accept on the ground that it would be recognizing the union.

Approves Modified Ordinance.—The bond owners protective committee of the bankrupt Saginaw-Bay City Railway has given its approval to the modified street car-bus ordinance. A special election has been ordered by the City Council for Monday, June 25.

Wages to Be Arbitrated.—Men of the Eastern Massachusetts Street Railway, Boston, have voted to accept the recommendations of the wage conference committee which were recently submitted for their approval. The question of wages will now go to arbitration.

Mistake Made in Wage Announcement.—The Cedar Rapids & Marion City Railway, Cedar Rapids, Ia., has increased the wages of its trainmen 5 cents an hour effective May 1. It was incorrectly stated in the ELECTRIC RAILWAY JOURNAL, issue of May 12, that the wages had been advanced 10 cents. Prior to May 1, the maximum wage was 45 cents an hour. The maximum is now 50 cents.

Five New Books in One Week.—This is the record of the McGraw-Hill Book Company during the week ended May 26. The five books just published are: "The Ore Magmas," 915 pages, by J. E. Spurr, "Principles of Chemical Engineering," 637 pages, by Professors Walker, Lewis and McAdams; "Applied Mechanics," 293 pages, by Professor Poorman, "Foundations, Abutments and Footings," 414 pages, and "Structural Members and Connections," 611 pages. The two last mentioned are the first of a series of six volumes of a structural engineers' library compiled by a staff of specialists, with Professors George A. Hool and W. S. Kinne of the University of Wisconsin editors-in-chief.

Financial and Corporate

Receiver's Report Encouraging

Traffic Returning in Kansas City, Mo., but End of Receivership Is Apparently a Long Way Off

The total railway operating revenue of the Kansas City (Mo.) Railways in 1922 was $10,404,744, an increase of $424,698 over that of 1921, or 4.26 per cent. The auxiliary operating revenue of the property showed a decrease in 1922 of $236,993, so that the total operating revenue made a net gain for the year of $187,705. It is explained that the reason for the decrease in auxiliary operating revenue was due to the discontinuance by the Kansas City Light & Power Company of purchasing a portion of its electrical energy from the railway during the year 1922, when the power company completed its own generating station. It will be noted, however, that a material reduction in auxiliary operating expenses has offset this loss of revenue.

The income statement shows gross income of $1,490,525 in 1922, as compared with $1,370,012 in 1921, an increase of $120,512 or 8.80 per cent. No deduction is made in these figures for depreciation. The gross income, however, is arrived at after deducting all operating expenses, including taxes, and after providing for all personal injury and damage claims incurred during the receivership, and after payment in 1922 of $77,100 allowed by the court for rental of the Intercity viaduct from date of the receivership to Dec. 31, 1922, and for which rental no accrual had been previously set up.

The receivers report the gross income for the first quarter of 1923 as $388,550, being an increase of $43,332 over the corresponding three months of 1922; the 1923 figures are after setting aside $43,649 for additional maintenance of way and structures when weather conditions are favorable for such work.

The number of revenue passengers carried in 1922 was 136,076,541, against 130,843,482 in 1921; transfer passengers carried in 1922 numbered 68,191,873 and in 1921, 63,880,843. Including employee and free passengers carried the lines transported 205,544,606 passengers in 1922 and 196,023,605 in 1921. The revenue derived from paying passengers averaged 7.51 cents in 1922, against 7.56 cents in 1921. The average fare collected per revenue, transfer and free passenger during 1922 was 4.97 cents and in 1921, 5.01 cents.

There has been no change in fares in almost four years past; tickets are still sold on a 7-cent basis, token fares at 7½ cents and cash fares at 8 cents per passenger; these rates were last extended from November, 1922, to May 18, 1923, by the Public Service Commission of Missouri. The same rates are in effect in Kansas. Children's fares are practically half the regular rates.

The number of revenue passengers carried in 1922 was the second largest in the history of the property, but still approximately 1,000,000 less than in 1917, although in this interval the population of Kansas City, Mo., and of Kansas City, Kan., has increased from 415,000 to 470,000, or 13 per cent. The receivers estimate that in 1922, 24,000,000 more passengers were carried in privately-owned automobiles than were carried in such vehicles in 1917. It is explained by the chairman of the protective committee for the holders of the first mortgage bonds that the elimination of jitneys, which has been practically accomplished, is the one thing that has made possible the operation of this property on such a basis that operating expenses and taxes have been paid out of earnings. Had the jitneys not been curbed, either a considerably higher fare would have been necessary or the loss to the property would have been so serious that consideration would necessarily have been given to the abandonment of service.

INCOME ACCOUNT OF THE KANSAS CITY RAILWAYS

	1922	1921
Total railway operating revenue	$10,404,744	$9,980,046
Auxiliary operating revenue	257,008	494,002
Total operating revenue	$10,661,753	$10,474,048
Railway operating expense	$8,605,735	$8,375,225
Auxiliary operating expenses	145,306	312,538
Total operating expenses	$8,751,042	$8,687,764
Net operating revenue	$1,910,711	$1,786,284
Taxes	$533,593	$478,622
Operating income	$1,377,117	$1,307,661
Misc. non-operating income—joint	14,133	16,598
Gross income—joint	$1,391,251	$1,324,259
Net surplus income above 6 per cent—Mo. Gross income joint—company's proportion	$1,391,251	$1,324,259
Interest on securities owned	$91,977	$38,470
Interest on bank balances	7,275	7,282
Bond exchange fees, etc.	21	....
Misc. non-operating income—company	$99,274	$45,753
Gross income company	$1,490,525	$1,370,012
Interest on:		
Funded debt	$1,683,810	$1,683,810
Receivers' certificates	.....	3,776
Notes payable	159,454	164,734
Injury and damage cert., Mo.	5,714	5,714
Injury and damage cert., Kan.	1,863	1,863
Other obligations	4,603	353
Amortization of discount on funded debt	4,028	50,861
Miscellaneous debits	32	530
Interest on:		
Mortgages payable	820	1,257
Wyandotte Co. bonds	16,504	16,504
Bondholders' pro. com. notes	32,198	32,198
Total deductions from gross income	$1,909,030	$1,961,604
Net income	$*418,504	$*591,591

*Deficit

On Dec. 29, 1922, the receivers by direction of the court abandoned service on the elevated road between Kansas City, Mo., and Kansas City, Kan., as a result of the report of the engineers of the receivers and of the two cities that the continued operation of cars over the structure would be extremely dangerous because of the fact that the structure is worn out. The engineers also reported that repairs to the structure are impossible as the structure is so light and the wear has been so great that repairs cannot be made.

On Jan. 31, 1923, certain members of the first mortgage bondholders' committee, certain members of the noteholders' committee and a representative of the second mortgage bondholders met in conference in Chicago and it was the unanimous sentiment of the representatives of the security holders that some material concessions should be sought with respect to obligations now imposed against the property in the event the rebuilding of the structure be ordered at the expense of the estate. The estimated cost of such reconstruction is $550,000. Due to the abandonment of service over the elevated road, routes formerly operating thereover have been detoured on other lines at some increase in cost due to the lengthening of haul. At an informal discussion of the matter with the court, M. A. Traylor, chairman, Silas H. Strawn and Richard J. Higgins, counsel for the committee, presented the views of the security holders to the court. No order has been made by the court requiring the rebuilding of the structure, but the matter is still pending.

The principal liabilities of the property outside of secured debts are the claims for personal injury and damages, which must be disposed of before reorganization is possible. Representatives of these claimants have raised the issue of priority of these claims over that of the first mortgage bonds and secured notes. The question has not yet been argued before the court, but it is hoped that the matter will come up for disposal in the near future.

The Kansas City Railways' franchise in Kansas City, Kan., expired by limitation on Dec. 25, 1922. The operations of the receivers in Kansas City, Kan., have continued without interruption or question. This grant is regarded as unfavorable in many respects to the owners of the property, so that the expiration of the franchise is not considered a detriment to the property.

New Interests in Control of Quebec Property

Actual change of control of the Quebec Railway, Light, Heat & Power Company has been brought about, according to the *Canadian Financial Post*, by the acquisition by the Shawinigan Company of a large block of shares in the Quebec Railway, sufficient to give the Shawinigan Company control of the situation.

As noted in the ELECTRIC RAILWAY JOURNAL for May 19, page 863, the

president, E. A. Robert, has resigned, and a new board of directors has been appointed which includes some of the former directors of the company who have been interested in its operation for a long time and representatives of the Shawinigan Company. Julian C. Smith, Montreal, vice-president and general manager of the Shawinigan Water & Power Company, becomes president.

Mr. Smith indicates that the company's properties will require very substantial sums to be expended in the railway, light, power and gas departments in order to provide adequately for the additional business which is available. The new directors are:

Julian C. Smith, Howard Murray, W. S. Hart, C. E. Taschereau, M. P., J. H. Fortier and James McCarthy, representing the new interests, and Lorne C. Webster, J. P. B. Casgrain, A. Turgeon, D. O. L'Esperance and Charles G. Greenshields, of the former board.

Julian C. Smith, president; Howard Murray, vice-president; W. S. Hart, treasurer; James Wilson, secretary, and Arthur Lemoine, assistant secretary.

The question of the relationship of the Quebec Railway with the citizens of Quebec comes up now. Mr. Robert planned to make arrangements with the city for operation of the tramways and gas service on the service-at-cost basis, but the attitude of the new management toward this proposal is not known.

Utility Engineer and Accountant Named in Louisvilile

In a recent communication to the lower board of the General Council, Mayor Quinn of Louisville announced the appointments of George W. Hubley and Charles Rosen as engineer and accountant respectively of the new public utilities supervising bureau.

The Utilities Bureau was formed to supervise the utilities, its principal work being in accounting and recording of costs, and being a sort of third party in deciding questions of rates allowed utility companies, when a need of adjustment of rates is shown. The bureau will not cost the city a nickel, as the Louisville Railway, Louisville Gas & Electric Company and Louisville Home Telephone Company each agreed to pay $10,000 a year for the upkeep of the bureau. Heretofore there were no records available in disputes and the matter of rate adjustment was a hard one to handle.

Detroit Income $80,978 in April

The net income of the City of Detroit Department of Street Railways during April was $80,978, being obtained after meeting all the usual operating expenses and providing reserves to meet sinking fund and interest payments. The net income during March was $98,025, but it is explained that March had thirty-one days, of which five were Saturdays and four Sundays, while in April there were five Sundays and four Saturdays. The highest revenues are obtained on Saturdays, whereas Sundays usually show a falling off.

During April 31,745,805 revenue passengers and 9,939,732 transfer passengers were carried, a total of 41,685,537. In March the total of passengers carried was 43,227,309.

Operating expenses for April were $1,290,077, as against a total passenger revenue of $1,693,767. The daily average expenses were higher than in March, due to increased maintenance work, which better weather conditions made possible.

April marked the first month the Detroit Street Railway has been placed on the departmental budget system. It is believed with the issuance of the June report it will be possible to make comparisons with the similar month in 1922 for the first year of operation by the city has now been ended.

City and Company $6,000,000 Apart

Report of City Engineer at Norfolk, Va., Indicates Wide Difference Over Valuation in Case Before Commission in Which Company Is Seeking Seven-Cent Fare

The inquiry into the financial and physical condition of the railway division of the Virginia Railway & Power Company at Norfolk, Va., ordered by the city of Norfolk as a result of a petition by the company for a 7-cent fare has been completed by Edwin Wortham, consulting engineer of Richmond. The survey was made with the co-operation and assistance of Walter H. Taylor, 3d, city engineer of Norfolk. On the recommendation of the engineers that a 5-cent fare is feasible in Norfolk the city is fighting the petition before the State Corporation Commission.

The appraisal by the engineers for the city was made upon the theory of reproduction cost new, less depreciation, plus a value for the enterprise as today established and developed in excess of figures ascertained from inventory, and prices prevailing during the year 1922.

The reproduction cost new was found to be $7,242,195. The property is declared to have depreciated to the extent of 27.1 per cent ($1,962,005), and, therefore, to possess a sound value of $5,280,190. To this the engineers added development expense of $792,028, making a total of $6,072,218, upon which the company is entitled, if it can, to earn an inviting return. The report says :

As is well understood, the property has not been maintained as it should have been. Large sections of track and other structures must soon be rebuilt. This reconstruction, as deferred maintenance, in large part should be cared for from revenue. Because of recent compliance with this sound business idea and upon the theory of continued compliance therewith for several years to come, and for the reason hereinabove set forth, we admit and suggest a value of $792,028 in excess of the present worth of the physical property.

Three years have passed since an appraisal of this property by the firm of Stone & Webster. During this period the company has engaged extensively in new construction and repairs, and has at the same time removed track of more than equal lengths to the track laid. We have found it almost impossible to connect the very minutely recorded work of Stone &

COMPARISON OF NORFOLK VALUATIONS

Statement of estimated cost to reproduce new, the property used in railway operation in Norfolk City and County, as of 1920, by Stone & Webster, and the estimated cost new, with its "sound value," as of January, 1923, by the City of Norfolk.

	Stone & Webster Cost, 1920	City Cost New, 1923	City "Sound Value," 1923
Right-of-way	$255,785	$146,033	$146,033
Land	893,764	331,264	331,264
Grading, Ballast, Ties, Rails and fastenings, Track, special work, Track, laying and surfacing, Paving	3,337,961	2,756,570	1,650,452
Roadway tools	4,419	4,133	3,422
Bridges, trestles and culverts	532,284	331,582	233,443
Crossings, fences, etc.	10,320	9,082	7,266
Signals			20
Telephone and telegraph	5,024	4,521	3,617
Poles and fixtures	80,319	84,823	64,558
Underground conduits	16,725	16,490	11,447
Distribution system	373,043	348,706	243,599
Substation bldg.	46,627		
Shops and car houses	341,544	212,080	180,422
Miscellaneous buildings	110,203	94,718	73,675
Docks and wharves	78,531	116,596	73,868
Substation equipment	260,830		
Shop equipment and tools	42,527	23,534	10,000
Park and resort property	490,545		
Revenue cars	921,419	1,031,849	696,562
Electrical equipment of cars	517,918	511,623	360,052
Other rail equipment	31,530	25,071	16,219
Miscellaneous equipment	28,177	27,160	10,608
Furniture and fixtures	4,082	2,858	2,287
Contractors' services	516,570		
Taxes during construction	101,773	69,260	69,260
Interest during construction	838,079	213,662	213,662
Administrative organization during construction	116,259	78,000	78,000
Legal expenses during construction	77,506	52,000	52,000
Engineering cost	232,517	150,000	150,000
Organization Prior to Construction			
Preliminary investigations(a)	15,017		
Cost of selling securities(b)	567,000	366,000	366,000
Permanent organization(c)	106,571	50,000	50,000
Interest on a, b and c	165,261		
Material and supplies	104,869	128,200	127,346
Minimum cash balance	118,400		
Totals	$11,343,399	$7,242,195	$5,280,190

Webster with the physical properties, as they stand today, and therefore, have not been able to debit and credit the inventory preparatory to applying new unit prices. It has been necessary to a very large extent to prepare an entirely new inventory. The items of the Stone & Webster report though paralleled by us, cannot be weighed and compared, except as to totals, representing periods three years apart. We have not included in this inventory property to the value of $1,717,199, which for sound business reasons should not be classified as railway property.

By deducting this $1,717,199 from $11,343,339, the total of Stone & Webster's appraisal of approximately the same inventoried properties, we have $9,626,200. To this must be added capital expenditures of $877,272 for the years 1920-21-22, less cars retired, $223,176, making a total of $10,280,296, in comparison with reproduction cost by the city as of Jan. 1, 1923, of $7,242,195.

All of the above items, except worn-out cars, have value as stated, but according to our convictions do not belong in the column of assets of railway property, intended to establish a fair value for rate making purposes.

A study of the company's statements of bonds and stock allocated to the Norfolk Railway division lead the engineers for the city to conclude that the percentage of fixed interest bearing liabilities was higher than it should be and that this in turn accounted for the abnormally high amount per year for fixed charges.

The engineers say there has been a marked improvement in all branches of the service and conditions of the property since the war. They then say:

Since the first of this year the company has been figuring its depreciation and renewal reserve on the basis of 3 per cent of railway depreciable property, ordinarily a sound and sufficient amount. Had this policy been started sooner, the funds available for this purpose would have been more nearly in keeping with the requirements. It is our conviction, however, that because of accrued depreciation a greater amount must be made available and spent for this purpose from revenue for the next few ensuing years, as hereinbefore stated.

The ordinary expenses of the Norfolk system compares favorably with other places. Certain economics of operation, however, should be adopted which would speed up the net running time, thereby reducing the expense of hauling each passenger, which in turn would mean higher net earnings and dividends to the company, as well as better service for the rider.

Much has been said of the expenses of this company due to franchise requirements, as these requirements regulate paving upon the streets of the city of Norfolk occupied by the tracks. You recall an agreement upon this point when phrasing a new franchise to the extent that in paving a street initially, the city should pave from curb to curb including the car track area, but that the maintenance of this pavement ever after should be an obligation of the transportation company. This we think fair and correct.

Of the local traveling public, it was found by the engineers that 85 per cent or more avail themselves of the street cars and less than 15 per cent ride in jitneys. The day has not yet arrived, say the engineers, when capital will invest in jitney transportation in cities of the size of Norfolk sufficiently to establish a dependable service. There can be no doubt as to a choice between the two systems, should it become necessary to make such a decision. The city's engineers realized that both are here to stay, but they do say that if possible the two modes should be so regulated as not to injure one another financially. When this is not the case the 85 per cent of traveling public suffers for the benefit of a comparative few favored citizens.

Appreciation Expressed for Company Co-operation

In calling attention to exhibits Nos. 6 and 10 the engineers say that the present earnings of the company during the twelve months prior to this report, except for the short period of the strike, evidence a net return of 7.1 per cent upon the "sound value," found by them. In conclusion they express the opinion that the initiation of additional economies in operation, relief from unjustified short-haul jitney competition, and legitimate credit to the Norfolk Railway division of revenue from holdings in other companies, would permit the return to a 5-cent fare, with a reasonable charge for transfers.

Appreciation is expressed by the engineers of the courtesies extended by President Wheelwright of the Virginia Railway & Power Company in furnishing them information promptly and in permitting access to the company's records.

The figure of 7.1 per cent noted previously as being the net return upon the "sound value" is disputed by the Virginia Railway & Power Company on the ground that $50,000 a year interest on bonds of the Norfolk Light & Power Company owned by the company is included in its makeup. The company holds that this $50,000 revenue from holdings in the light and power company should not be included in this figure, which would bring the 7.1 down to about 6 per cent.

Valuation Ruling by Supreme Court

Highest Court Reaffirms Its Stand that Contemporary Cost Must Be Considered in Valuations

Reaffirming and strengthening its previous position that contemporaneous reproduction costs must be taken into consideration in fixing rates for public utilities, the United States Supreme Court on May 21 reversed the Missouri Supreme Court which had upheld an order of the Public Service Commission directing the Southwestern Bell Telephone Company to reduce rates.

The court was unanimous as to the reversal in this specific case, but Associate Justice Brandeis filed a separate opinion, with which Associate Justice Holmes concurred. Associate Justice McReynolds read the majority opinion, which dwelt at length upon the necessity for taking into consideration costs of physical reproduction at the time new rates are ordered by a regulatory body. Justice Brandeis agreed with his associates of the court in the reversal on the ground that the rates declared by the Public Service Commission were not sufficient to insure a fair return on a "prudent" investment, but in his separate opinion he declared that the theory of contemporaneous reproduction costs is "legally and economically unsound."

A few days after Aug. 1, 1919, when telegraph and telephone lines were released from federal war-time control, the Missouri Public Service Commission issued an order to the Southwestern Bell Telephone Company to show cause why exchange rates should not be lowered and installation and removal charges abolished. The rates and charges then existing had been fixed by order of the Postmaster-General. Appraisals at St. Louis, Caruthersville and Springfield, which had been made before the war, were used by the commission at the hearing. The company contended that reproduction costs at the time of the hearing were considerably greater than the figures shown in these appraisals. Various items of expense also were disallowed, such as rental paid to the American Telephone & Telegraph Company for apparatus. Reductions were

Conspectus of Indexes for May, 1923

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	May 1923 **6.88**	Apr. 1923 **6.89**	May 1922 **7.14**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	Apr. 1923 **175**	Mar. 1923 **174**	Apr. 1922 **157**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	May 1923 **208**	Apr. 1923 **207**	May 1922 **211**	Sept. 1920 **232**	Apr 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Apr. 30 1923 **7.29**	Mar. 31 1923 **7.40**	Apr. 30 1922 **5.10**	July 31 1920 **11.12**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	Apr. 1923 **15.00**	Mar. 1923 **15.43**	Apr. 1922 **12.24**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures Number	Apr. 1923 **1,638**	Mar. 1923 **1,677**	Apr. 1922 **1,954**	Jan. 1922 **2,722**	Sept. 1922 **1,460**
Liabilities (millions)	**51.66**	**60.62**	**73.03**	**185.7**	**32.51**

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	May 1923 **216.7**	Apr. 1923 **213.5**	May 1922 **164.6**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Apr. 1923 **159**	Mar. 1923 **159**	Apr. 1922 **143**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	May 1 1923 **13.67**	Apr. 1 1923 **13.93**	May 1 1922 **11.70**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's—Wholesale Commodities 1913 = 120 9	May 1 1923 **192.9**	Apr. 1 1923 **193.1**	May 1 1922 **166.1**	May 1 1920 **283.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Apr. 1923 **143**	Mar. 1923 **142**	Apr. 1922 **139**	June 1920 **215**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Apr. 1923 **159.1**	Mar. 1923 **159.2**	Apr. 1922 **154.8**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

ordered. The company sued for relief from the order in the Cole County Circuit Court. That court upheld the order, as did the State Supreme Court, whereupon the company appealed to the United States Supreme Court on the grounds of confiscation.

In the majority opinion, the court of last resort declares that "obviously the commission undertook to value the property without according weight to greatly increased costs" of reproduction. A fair return must be assured, the court said, and "estimates for tomorrow cannot ignore prices of today."

Regarding the commission's action in disallowing rental paid the American Telephone & Telegraph Company for apparatus, the majority opinion declares that this appears to be a fair system, not extraordinary in business, and adds that "it must never be forgotten that while the state may regulate with a view to enforcing reasonable rates and charges, it is not the owner of the property of the public utility companies and is not clothed with the general power of management incident to ownership."

Elimination of Tax-Exempt Securities Improbable

The best opinion in Washington is that the proposed federal legislation to eliminate tax-exempt securities is doomed to fail. The relief from the impositions on such issues, sought by large users of money, such as the public utilities, whose securities are taxable, will have to be sought in other directions. This matter failed to come to a vote in the last Congress, but it is expected it will be brought up again before the next Congress. Passage of such a measure, however, is considered very unlikely.

Sale of Toledo & Western Will Be Advertised

A decree in foreclosure against the Toledo & Western Railroad, has been issued by Federal Judge John M. Killits at Toledo and sale will probably be advertised shortly for a date in June. The receivers, Harry A. Dunn, Joseph A. Yager, and Albert Swartz, were made special masters to conduct the sale at the headquarters of the company at Sylvania, Ohio.

Underlying mortgages covering the property are the Toledo & Western Railway, first mortgage 5 per cent bonds for an aggregate of $1,250,000 dated July 1, 1901, which with coupons due since July 1, 1920, amount with interest to a total of $1,477,580; the Toledo, Fayette & Western Railway, first mortgage 5 per cent bonds for an aggregate of $250,000 dated Nov. 1, 1902, which with unpaid coupons from July 1, 1920, and interest amount to a total of $295,516. There was a second mortgage issued on April 1, 1905, known as first consolidated and refunding mortgage securing an issue of 5 per cent bonds. The principal amount was $2,500,000 but only $500,000 was issued and outstanding. With coupons due since Oct. 1, 1905, this issue amounts to a total of $1,192,048.

Bids must be accompanied by a deposit of $55,000 in cash to insure good faith. The Cleveland Trust Company, as trustee, brought the action for foreclosure.

The line is about 60 miles in length from Toledo to Pioneer, Ohio, with a 20-mile branch line to Adrian, Mich.

B.R.T. Properties Sold Under Foreclosure

The Central Union Trust Company, as trustee of the Brooklyn Rapid Transit Company, acting under a decree issued by Federal Judge Mayer on April 5, sold for $25,000,000 on May 21 first mortgage bonds of the New York Municipal Railway Corporation to the face value of $57,735,000. Later in the afternoon E. Henry Lacombe, special master appointed under the decree, sold for $10,000,000 all the holdings of the Brooklyn Rapid Transit Company.

At both sales there was only one bidder. Alfred E. Mudge of Rushmore, Bisbee & Stern, representing the Brooklyn Rapid Transit reorganization committee, presented bids on behalf of Albert H. Wiggin, Gerhard M. Dahl and Frederick Strauss, the purchasing committee under the reorganization plan. His bids, aggregating $35,000,000 for the mortgage bonds and for the B. R. T. assets, were accepted and will be presented to Judge Mayer for approval.

A third sale, that of the property of the New York Municipal Railway Corporation and the New York Consolidated Railroad, its operating company, was to have been held, but it was postponed until May 29.

The sales of the bonds and property of the company are a step in the reorganization of the Brooklyn Rapid Transit Company, which is expected to take it out of the hands of the receiver. This is expected to take place within a few days. In anticipation a new company, the Brooklyn-Manhattan Transit Corporation, was incorporated on May 24 as the successor. On the same day the court confirmed the sale of the assets conducted on May 21 and referred to previously.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

I. T. S. Merger Plan Approved.—The Illinois Commerce Commission on May 18 approved plans submitted to it for the consolidation of the Illinois Traction, North American Light & Power and other companies. Reference to this application to the commission has been made previously in the ELECTRIC RAILWAY JOURNAL.

Bonds Called for Redemption.—All Evansville & Princeton Traction Company bonds bearing the date of April 1, 1903, have been redeemed by the Southern Indiana Gas & Electric Company at 105 per cent of par and accrued interest. The total amount that remained outstanding on April 1 was $250,000.

Redemption Date Announced.—All of the outstanding first mortgage 5 per cent gold bonds, dated Oct. 1, 1919, due July 1, 1924, Series A, and all of the outstanding first mortgage 6 per cent gold bonds, dated Oct. 1, 1919, due July 1, 1924, Series B, of the Paducah Electric Company have been called for retirement and will be paid on June 1, 1923, at their face value and accrued interest at the office of State Street Trust Company, trustee, Boston.

$44,000 Note Issue Authorized for Improvements. — The Madison Railways, Madison, Wis., has been authorized by the Wisconsin Railroad Commission to issue $44,000 of notes, $37,000 of which will be used to provide funds to pay improvements to its East Johnson Street line.

Change of Name Contemplated.—The stockholders of the Scioto Valley Traction Company, Columbus, Ohio, will vote on June 7 on changing the name of the company to the Scioto Railway & Power Company. The question of taking care of the $1,426,000 of first mortgage 5 per cent bonds, due Sept. 1, will also come before the meeting for consideration.

New Director for Lake Shore Road.—Harris Creech, who succeeded the late F. H. Goff as president of the Cleveland Trust Company, has been elected to succeed Mr. Goff on the directorate of the Lake Shore Electric Railway, Cleveland, Ohio. He has also been named to the board of the Cleveland, Painesville & Eastern Railroad, as the successor Mr. Goff.

Sale of Carhouse Property Confirmed.—Judge Julius M. Mayer in the Federal District Court at New York, has confirmed the sale at auction of the carhouse property of the New York Railways, bounded by Fourth and Lexington Avenues and Thirty-second and Thirty-third Streets, New York City. The property was purchased by Harry Newmark, Fred Brown and another, for $1,600,000. The New York Railways is in the hands of a receiver.

Sale Under Foreclosure Ordered.—A decree has been entered in the United States District Court ordering the sale of the property of the Michigan United Railways to the highest bidder on June 30. The minimum bid to be received has been set at $5,000,000. The sale will be held at Jackson, Mich. The plan under which it is proposed to carry out the reorganization of the company has been reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Bonds Extended.—The $500,000 first mortgage 5 per cent bonds of the Lehigh Traction Company, Hazleton, Pa., due on June 1 next are being extended for a period of ten years at the same rate of interest. On June 1, however, the bondholders will receive a bonus of $7.44 upon each $100 of bonds. The payment of the bonus will reduce the amount of the principal invested and by receiving the sum ten years in advance of the extended maturity date gives the investor 6 per cent instead of 5 per cent on his money.

Traffic and Transportation

Accident Map Useful

Los Angeles Company Emphasizes Places of Danger by Means of Red Buttons

The Pacific Electric Railway of Los Angeles, Cal., is constantly emphasizing the need of more care on the part of motormen in avoiding traffic accidents, and repeatedly urging the trainmen to "use more care."

This campaign gains its principal incentive through the medium of efficiently organized and active safety committees.

There are three division safety committees, one for each of the three divisional operated lines, and a central safety committee.

There are four safety meetings each month; one for each of the three division committees and one for the central committee.

Various methods are adopted for impressing more care upon the trainman's part, such as campaign drives of impressive talks to trainmen by the general claim agent and other representative operating officials. Examples of carelessness are vividly brought to the attention of the men to stimulate the element of precaution.

Furthermore, the employees' magazine each month devotes a page or two toward interesting the trainmen in this vital subject.

In this respect the company has pointed out that the vast number of automobiles now traversing the highways and streets, and parked along the curbs, has greatly increased the accident hazard and created a situation which makes it imperative that all concerned substitute "extraordinary care" for ordinary care if the accident record is to be lowered. The company has explained to the trainmen what is meant by "extraordinary care":

Less speed, operating under absolute control.
Keep a *safe* distance back of the vehicle ahead.
Being *sure* of clearance when passing vehicles.
In knowing that every congested area is a *danger point.*
In applying *brakes* earlier when traffic jam occurs.
A more frequent use of *gong* and *whistle.*
In knowing that any automobile may do the *unexpected.*
In taking *no chances;* the automobile fellow will do that.
And, notwithstanding all your care, if there should come a time when you do have an accident, get all the witness cards as a personal favor to you, that you may clear yourself of any liability.
Automobiles are becoming more numerous every day, which means an ever increasing army of irresponsibles, indifferent to the meager traffic laws or to the rights of others. Everything depends upon the care we exercise.
Ordinary care will not meet existing conditions, therefore, we must use *extraordinary care;* begin today!

Recently the company adopted a novel method of concretely impressing upon trainmen the necessity for precaution. At each of the division points in several cities a large map of the city is prominently displayed which shows routes of the company's lines and the city streets traversed and crossed.

Whenever a street car has a collision with a vehicle on any street or at some particular street crossing, a red button is stuck on the map at the location of the accident. If several accidents happen at this particular location at subsequent periods of time, additional red thumb tack buttons are stuck on the map at the particular place. While trainmen are congregated about divisional headquarters before assuming or after leaving their runs, a point is made to impress upon them the value of this map record of accidents. The appearance of several buttons at one given location is, of course, an automatic signal of danger at that particular location.

Ladies Taken to Task by Portland Mayor

The somewhat strenuous efforts of the Housewives' Council of Portland, Ore., to resurrect the jitneys for the purpose of securing lower transportation rates have met with failure at the hands of a stern, unfeeling group of City Fathers, headed by Mayor George L. Baker.

The Housewives' Council is made up largely of ladies who are politicians first and housewives second if at all. The members turned to the jitney idea after their efforts to force the Public Service Commission to reduce the present 8-cent fare on the Portland Railway, Light & Power lines back to the lowly nickel had come to naught.

Mrs. Josephine Othus, president of the Housewives' Council, explained to the commissioners that they tried to get a 5-cent fare restored, and couldn't, and then decided that the next best move was to request the city authorities to repeal all existing laws governing jitney operation and allow the buses to run in competition with the trolley cars.

After a lengthy statement had been made by Mrs. Othus, supported by several other members of the delegation, Mayor Baker explained that he held no brief for the railway, but that he was unalterably opposed to allowing the jitneys again to run wild in the streets. He said:

> We have had experience with the jitneys and know that they are a menace to the people and that they do not give adequate service. They are placed on the short runs, while the people in the outlying districts get no service at all. The voters of Portland have spoken, and unless the voters decide to return to jitneys I will oppose amendment of any ordinance that would bring about a return to the hectic days of jitney service.

Other members of the City Council took a similar position with the result that the request made by the Housewives' Council was placed on file.

Offers Plan for Traffic Relief in La Crosse

Pursuant to a request from the city authorities of La Crosse, Wis., for traffic rule suggestions, to the end that collisions between autos and street cars may be avoided and the number of other accidents lessened, R. M. Howard, vice-president of the Wisconsin Railway, Light & Power Company, operator of the local system in La Crosse and the line between La Crosse and Winona, Minn., has outlined a plan to alleviate the situation.

Mr. Howard first suggests the establishment and marking of arterial highways with the rule that all cars crossing or turning into these highways from a cross street be required to come to a full stop. Further, that parking should be prohibited on the principal streets of La Crosse for a distance of two blocks and that this principal street be one of the arterial highways. A third suggestion is that a rule be made, and penalties established to enforce it, prohibiting the crossing of streets in the business district by pedestrians at any point except on the established crossing.

Mr. Howard said he would like to have a month's trial of the plan of designating the principal street as an arterial highway with parking eliminated for a distance of two blocks or four blocks. He believed that the results in speeding up traffic and relieving the present congestion would be so satisfactory that the plan would be extended to other streets.

Withdrawal of Paving Obligation Ends Fare Controversy in Madison

The controversy between the city of Madison, Wis., and the Madison Railways in regard to fares and paving has at last been settled.

The settlement ordinance releases the Madison Railways from all obligations to bear any part of the costs of paving between the car tracks. The company must, however, bear the additional costs due to the presence of the railway tracks in the street. In consideration of such relief the company agrees to extend its tracks on East Johnson Street and to extend its tracks on Monroe Street as far as Crandall Court.

The Madison Railways immediately upon the passage of the ordinance withdrew its request to the commission for an increase in rates. The commission has ordered the company to extend its tracks, for it feels that the revenues of the company warrant an extension and that the part of the city in question is not being properly served at present.

The company will, no doubt, take steps at once to carry out the extensions and double tracking. Officials of the railway and the commission indicate that the likelihood has thus been removed of any increase in fares now or in the future.

Ten-Cent Fare in Seattle on June 23

According to present plans, fares in Seattle will return to the 8½-cent basis on June 23, as Mayor E. J. Brown states that he will not veto the ordinance for higher fare passed by the City Council. The measure will be allowed to become a law without his signature.

The 5-cent fare has been in force since March 1, and the railway has consistently lost money until railway and city officials realized that a return to the higher fare is absolutely essential. The fare will be 10 cents cash, with three tickets for 25 cents.

With the higher fare voted, the way is now open to negotiate with the bondholders for an extension of the term of the railway purchase bonds, Council members point out. Four plans have been tentatively discussed, three of them providing for extension of the bonds to forty years, with interest at 4, 4½ and 5 per cent. The fourth plan provides for paying a fixed sum annually in addition to the interest so the bonds would be retired at the end of about forty years.

Queens County Adopts Boston Type of Transfer

The New York & Queens County Railway, Long Island City, has adopted the Moran type of transfer used on the Boston Elevated Railway, as described in the issue of this paper for Aug. 26, 1922. The only changes made from the Boston type were to print the transfer conditions on the face of the transfer instead of on the reverse side, thus saving a printing process, and to have the p.m. transfer good until 3 a.m. instead of 12 midnight. The object of this change was to eliminate the necessity for men working late straight runs to carry a supply of a.m. transfers to be used after midnight.

The New York & Queens County Railway is now operating a 100 per cent one-man service, and the adoption of this particular transfer was largely because it does not have to be punched after the car leaves the terminal.

Public Will Be Asked to Discuss Beeler Recommendations

It is planned by the Commission Council of New Orleans on the suggestion of Commissioner Maloney, of the Department of Public Utilities, to invite the public to a conference to be held in the Council Chamber on the 125 or more recommendations submitted in the Beeler report for the improvement of the New Orleans electric railway service.

The members of the Commission Council desire to hear from the public, in open discussions, on the recommendations, before taking definite steps toward adopting the recommendations in part or as a whole. The Commission Council has been prevented from taking this step sooner by reason of the absence of its members by illness or otherwise, during the past two months. This delay has interfered with important paving projects and other works of civic improvement, that cannot be taken up until the electric railway matter is disposed of.

Jitney Lines in Houston Will Be Abolished July 1

In accordance with the instruction of the City Council of Houston for the submission of plans for the rerouting of jitneys the routes were presented to the Council on May 16.

After much discussion and very little progress in rerouting a motion was carried by a vote of three to one abolishing all jitney lines in the city effective July 1. This action by the Council was unexpected.

The jitney men wanted the Council to submit the question to a vote of the people, but it refused. However, the jitney men can force the matter to a vote by obtaining a referendum petition. Such a petition would only require approximately 2,000 signatures. No such petition is being circulated and the Houston Electric Company is now awaiting further developments.

The history of the jitney situation in Houston was reviewed in the ELECTRIC RAILWAY JOURNAL, issue of May 19.

Allows One-Man Car Operation.—The City Council will allow the Dubuque Electric Company, Dubuque, Ia., to operate one-man cars on one line for one year as an experiment. At present the company has in service a number of cars of the front-door type manned by two men, but designed for one-man operation.

Arrangements for Service Completed.—F. K. Woodring, general manager of the Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, reports that his company has completed arrangements by which interurban service from Marblehead and all points west of Toledo will be joined with the White Star Steamship Line for Detroit beginning June 1.

I. T. S. Opposes Bus Applicant.—The Illinois Traction System, Peoria, Ill., appeared before the Illinois Commerce Commission at Springfield on May 2 to oppose the issuance of a certificate of convenience and necessity to the Benld-Wilsonville Motor Bus Transportation Company to operate between Gillespie and Staunton via Benld and Sawyerville. The commission took the case under advisement.

Offices of Chicago Surface Lines Being Moved.—Most of the offices of the Chicago Surface Lines have now been moved from 105 South La Salle Street to 230 South Clark Street, occupying the eleventh and fourteenth floors of the new Illinois Merchants Bank Building. It is expected that the other half of this structure will be completed by May 1 next year, at which time the surface lines' offices, as well as the board of supervising engineers,' will occupy the entire fourteenth floor.

Traffic Changes Suggested.—Recommendation is made by the Johnstown, Pa., City Planning Commission that cars on the Johnstown Traction Company cross street intersections before stopping, rather than continue the present practice of stopping on the near side of the streets. The committee makes the request to relieve traffic congestion. The committee's request is especially urgent as relates to intersections where the cars turn off from one avenue to another, the commission believing that cars should make the corner turn to take on or discharge passengers. The commission also asks for the discontinuance of parking cars at certain streets.

No Fare Reduction Likely in Worcester.—Clark V. Wood, president of the Worcester Consolidated Street Railway, Worcester, Mass., speaking in relation to suggestions of reduced fares, said recently that no early reduction from the present 10-cent rate was to be expected. He said that the company's receipts to date were slightly in excess of last year, but not large enough to create a surplus and that passenger receipts had of late been on the decline, owing to the highways again being freed from a snowbound condition.

Gratifying Response by Public to "L" Improvements.—Grayson M.-P. Murphy, chairman of the board of directors of the Interborough Rapid Transit Company, New York, N. Y., said on May 15 that recent improvements on the elevated and subway lines to increase efficiency had been more successful than the company hoped. He referred particularly to the success of the additional express service on the elevated lines, and said that it had already attracted more business than anticipated, and had somewhat relieved the congestion on the subway. With the summer coming, it is the belief this service will be even more attractive. Mr. Murphy also said that the first of the sliding door cars that will eventually mean the elimination of the swinging door type now used will be put in operation on the elevated division next fall.

Six-Cent Fare to Continue.—A 6-cent fare will continue to be charged by the Little Rock Railway & Electric Company, Little Rock, Ark., now the Arkansas Central Power Company, as a result of recent action of the City Council. The public utilities committee reported adversely on the ordinance by Alderman Connor, to reduce the fare from 6 cents to 5 cents, and recommended that the fare be continued at 6 cents. Accompanying the statement from the Councilmanic committee was the report of the engineers representing the city and the railway, the engineers having fixed a valuation of the company's properties at $7,000,000 for rate-making purposes and saying that $150,000 should be charged off annually for reproductions. The report provided that the company should dismiss within five days its appeal from the order of the Council of July 11, 1921, denying to it the right to collect a 7-cent fare.

Personal Items

E. G. Stevenson, President

Head of Detroit United Railway Has Rendered Invaluable Service to Company as Counselor—A. A. Gingras Treasurer

Elliott G. Stevenson, president and chief counsel of the Detroit United Railway, was born on a farm in Middlesex County, Ont., on May 18, 1856. In his early childhood his parents moved to Port Huron, Mich., and since that time he has resided in Michigan; in Port Huron until 1887 and in Detroit since 1887. His summers, however, have been for many years and are now spent on his large farm located on the Canadian shore of the Detroit River, near Amherstburg. He did not have the opportunity to obtain and never did obtain a college education. The best that his family—whose means were limited—could do for him was to send him through the public schools at Port Huron and to supplement this by a short course at an academy at London, Ont. This constituted his entire formal school education.



E. G. Stevenson

Counsel in Many Famous Cases

In 1877 when he was only twenty-one years old, Mr. Stevenson was admitted to the bar, having acquired his legal knowledge by studying in the law office of O'Brien J. Atkinson, at Port Huron. In 1878, when he was only twenty-two years old, he was elected prosecuting attorney of St. Clair County, Michigan —the county in which Port Huron is located. In 1880 he was re-elected prosecuting attorney and held that office for another term of two years. He was Mayor of the city of Port Huron from 1885 to 1886. These were the only public offices he ever held or sought. He has stood for many years and stands now at the head of the Michigan bar. He is equally great as a trial lawyer, a wise adviser and a skillful and diplomatic negotiator.

Among the famous cases that he has successfully conducted may be mentioned the suit brought by the Dodge brothers against the Ford Motor Company and Henry Ford. In this suit Mr. Stevenson, as counsel for the Dodge brothers, obtained a decree compelling Mr. Ford, as owner of the majority of the stock of the Ford Motor Company, to distribute among the stockholders of that company $25,000,000 of its earnings for the fiscal year ended July 31, 1916. In consequence of this decree, Mr. Ford, in order that he might carry out his plans, was compelled to buy the stock of the other stockholders, and to do this, he had to pay and did pay the sum of $25,000 for each $100 of stock purchased by him. A more famous suit, perhaps, than the one just mentioned was the action of Henry Ford against the Chicago *Tribune*, tried at Mount Clemens, Mich., in 1919. Mr. Stevenson was the chief counsel for the *Tribune* company. This was a libel suit brought by Mr. Ford to recover damages because the *Tribune* had charged in a leading editorial that he was ignorant and was an anarchist. It will be remembered that in this suit, in examining Mr. Ford Mr. Stevenson asked questions which brought out from Mr. Ford the testimony that the American Revolution occurred in 1812 and that Benedict Arnold was a noted writer. In this case, Mr. Ford sought to recover $1,000,000 damages. The jury gave him a verdict of 6 cents.

Only a small part of Mr. Stevenson's extensive legal business has resulted in court trials. His attitude has been that, as a general proposition, controversies instead of being litigated should be adjusted. In effecting such adjustments, he has displayed extraordinary wisdom and skill and thus rendered his clients a far greater and more valuable service than he would had these controversies been successfully litigated in suit.

For many years, Mr. Stevenson has been the leading counsel of the Detroit United Railway and during the last year he has also been its president. The complicated and disturbed condition of this company's affairs made the task of managing its legal and executive departments one worthy of the extraordinary qualities possessed by Mr. Stevenson. Ruin could not have been averted had the person entrusted with those responsibilities possessed smaller ability. His services to the company have been invaluable. To those services more than to any other cause the present improved condition of that company's affairs is to be attributed.



A. A. Gingras

Montreal Man Is Treasurer

A. A. Gingras, the treasurer of the Detroit United Railway, became a factor in the affairs of the company about the time the negotiations were coming to a head for the purchase of the city lines of the company by the city itself. There is a large Canadian interest in the Detroit United Railway and has been for some time, and Mr. Gingras is the accredited representative of this following in the company. His position does not call for him to be in the public eye to the extent that Mr. Stevenson's post does. Neither officer courts publicity, but Mr. Gingras because of his position has been able to escape public attention whereas Mr. Stevenson by the very reason of his position has not been able so to escape. The silence of Mr. Gingras has not been studied, but the effect on the public has been the same as if his silence had been one of design. He is a factor in financial affairs in Montreal. but his activities there, while large and varied, have not been such as to focus public attention upon him. This has made him an elusive subject for anything like a fitting biography. He represents his constituents fitly, but he does it unostentatiously, so that even in Detroit little is known about the man outside of immediate company circles. He spends only a part of his time in Detroit.

John W. Hulme and George W. Dunlap Resign from International Railway

H. L. Mack, vice-president in charge of engineering of the International Railway, Buffalo, announces a redesignation of positions in his department with a specialist to handle each phase of the engineering activities of the company. The three divisions are headed by a superintendent of power distribution, which consolidates the positions of superintendent of power and superintendent of lines; engineer in charge of maintenance of way, which absorbs the duties of chief engineer, and superintendent of equipment, which includes superintendent of buildings.

With the announcement of redesignation of positions and consolidation of departments under three division chiefs, who report direct to Mr. Mack, comes the announcement of the resignations of John W. Hulme as superintendent of equipment and George W. Dunlap as superintendent of power, and the pro-

motion of Henry E. Riexinger to the new position of engineer of maintenance of way. George Kuhn becomes superintendent of equipment and buildings and Joseph Mack becomes superintendent of power distribution.

Joseph Mack has been superintendent of power lines of the International Railway since 1910. Mr. Mack has been with the company for thirty years.

Mr. Riexinger has been chief engineer of the International Railway since 1910. He will continue to handle the duties of chief engineer in addition to his new position.

Mr. Kuhn has been associated with the mechanical department of the company for thirty-five years. For some time he has been superintendent of buildings, but for many years he has served as assistant superintendent of equipment.

R. G. Near and A. M. Farrell Assume New Duties

R. G. Near has been appointed acting general freight and passenger agent of the Chicago, Ottawa & Peoria Railway with offices at Joliet, Ill. In this capacity he succeeds A. M. Farrell, who resigned this position to assume similar duties with the Eastern Wisconsin Electric Railway at Oskosh, Wis.

Mr. Farrell has been connected with steam and electric railways for almost twenty-five years. In that time he served as chief of the traffic department of the Chicago, Ottawa & Peoria Railway. In his early days in the railway field he was associated with the Ohio River Railroad at Parkersburg, W. Va., as clerk to the general superintendent. He gave six years service to the Baltimore & Ohio Railroad, three years as chief rate clerk at the local freight office in Huntington, and three years as rate clerk of the division freight office in Parkersburg, W. Va. Mr. Farrell also served the Western Terminal Trunk Line Association and the Coal & Coke Railway in Elkins, W. Va. The position he just relinquished he had held for three years.

His successor, R. G. Near, spent one year in the transportation department of the Northern Pacific Railway, Duluth, Minn. Prior to that he had given two years in messenger service with the Adams Express Company in Aurora and three years as agent for the Adams Express Company in Duluth, Minn., and Ottawa, Ill. Later he went to the Chicago, Ottawa & Peoria Railway in Ottawa to work in the transportation department. He has been with this company nine years, two years in the transportation department, three years as agent and dispatcher and four years in the freight accounting department.

A. H. Kendall, master mechanic of Quebec district, Canadian Pacific Railway, has resigned to become manager of the Chicoutimi Pulp Company, the Saguenay Light & Power Company and the Roberval & Saguenay Railway Company, Chicoutimi, Quebec.

Mr. Maddock at Providence

Former Eastern Massachusetts Engineer Made Assistant to Superintendent of Equipment of Rhode Island Lines

R. S. Maddock has been appointed assistant to the superintendent of equipment of the United Electric Railways, Providence, R. I. On March 27, 1899, when he was fifteen years old, Mr. Maddock enlisted in the United States Navy as an apprentice. He served on several ships and stations in various capacities, including signal boy, gun-pointer and quartermaster, until March 25, 1905. He then entered the employ of the Boston Elevated as a pit helper at City Point, and after a few weeks in the pit-room was assigned part time to office and store room work. Meanwhile he attended an evening high school special course to prepare for the Lowell Institute courses at the Massachusetts Institute of Technology. During his second year at City Point Mr.



R. S. Maddock

Maddock started courses at the M. I. T., taking electrical engineering two years and mechanical engineering two years. He was graduated in 1910.

Meanwhile he had been transferred at his own request in 1907 from City Point to East Boston in order to get experience on heavy equipments and multiple-unit control, which at that time was comparatively new for surface cars. After serving for two years in East Boston Mr. Maddock went to work as inspector for the Boston & Northern Street Railway, now the Eastern Massachusetts, under E. W. Holst, who was then superintendent of equipment. His duties called for supervision of cars run from several stations over tracks of other companies. In addition he acted as foreman for short periods in different carhouses. Later he was sent to West Lynn as assistant foreman, thence to Woburn as foreman and thence to West Lynn as foreman in 1911. The following year he was made inspector of car repairs and continued to act in that capacity until August of that year, at which time he left railroad work.

Returning to the railway field in 1915 Mr. Maddock was re-employed as inspector of car repairs by the Bay State Street Railway, now the Eastern Massachusetts. Since that time he has been assistant general foreman and shop foreman at the Chelsea shop, general foreman 1920 to June, 1922, and then equipment inspector. He continued to serve in the last-named capacity until March, 1923, at which time he resigned to enter the employ of the United Electric Railways.

Obituary

Dr. Hans Goldschmidt

Prof. Dr. Hans Goldschmidt, inventor of the widely known thermit process for welding iron and steel and for producing high grade metals and alloys, also originator of many other scientific inventions, died suddenly in Baden-Baden, Germany, on May 20 after a stroke.

Prof. Goldschmidt was born in Berlin on Jan. 18, 1861. After being graduated from the "gymnasium" of Altenburg, Hans Goldschmidt studied chemistry, physics and natural sciences in general at the universities of Berlin, Leipzig, Heidelberg, Strassburg and at the Institute of Technology at Charlottenburg. He received the degree of Ph.D. from the University of Heidelberg in 1886.

In 1887 Prof. Goldschmidt entered the firm of Th. Goldschmidt, Essen Ruhr, Germany, in joint partnership with his brother, Dr. Karl Goldschmidt. The attention of the latter was applied mainly to the business management of the company, while Prof. Hans Goldschmidt devoted himself to scientific research. Under their joint guidance the firm grew to international importance, with agencies and allied companies throughout the world.

Prof. Goldschmidt's most important invention was the thermit process, now used extensively all over the world for welding iron and steel sections and for producing metals and alloys of high purity.

Prof. Goldschmidt visited this country very frequently and was president of the Goldschmidt Thermit Company, now the Metal & Thermit Corporation, from 1904 to 1916. Through his death the world loses a chemist of great knowledge and inventive genius.

Henry Woodland

Henry Woodland, secretary and treasurer of the Allis-Chalmers Manufacturing Company, died suddenly at his home in Milwaukee on May 14.

Born in Utica, N. Y., Mr. Woodland at an early age became connected with the New York Air Brake Company, Chicago. Later he was treasurer of the Gates Iron Works, Chicago. When in 1901 this company was taken over in the consolidation which formed the Allis-Chalmers Company, he became assistant treasurer of the new organization and afterward its treasurer. In 1916 he was elected secretary and treasurer of the company.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Copper Buying Is Beginning Again

The Foreign Market is Uncertain, However, and Domestic Buying is Still Conservative—A Stable Price Is Likely

The present cheapness of copper in Europe appears to be due to the declining purchasing power of existing industries there, rather than to an actual abundance of the metal. The German government, which was a heavy buyer of American copper in 1919 and 1920, stopped work on many improvements at the time of the Ruhr occupation and at present has no money to carry them out. In Italy extension and repair work on telephone, telegraph and railway lines has been largely suspended awaiting the return of these industries to private operation. Copper is being bought in fair quantities in Great Britain, but in many of the smaller countries disturbed conditions have affected the market adversely.

The export of American copper is an enterprise entirely separate from the domestic market, being controlled by the Copper Export Association. Until the World War, about half of the copper sold in this country was for export. Owing to the elaborate organization of the metal trade in Europe, especially in Germany and England, and to the speculative foreign buying thus promoted, American sellers were not satisfied with the way their copper was being marketed abroad, and finally, at the close of the war, it was determined to correct some of the previous conditions. To that end, and partly to lift the burden of unsold stocks from American producers, the Copper Export Association was formed. This association, which will sell only to bona fide consumers, is temporarily out of the market.

Copper buying by domestic consumers has been conservative. Although manufacturers who use copper report a good quantity of orders on their books, deliveries have been held up in many cases by labor troubles, and they are therefore buying copper moderately. Over half the copper used in this country is used for electrical purposes, although in the last year or two, partly owing to the publicity campaigns of the Copper and Brass Research Association and private companies, and partly because of the comparatively low price of copper, that metal has been used in greatly increasing quantities for certain purposes to replace less durable materials.

Under present conditions, the principal factors that make for a large copper demand are the development of electric power by public utility companies and railroads, enlargement of telephone facilities, and an expanding building industry. The proposed electrification of steam railroads all over the world will require immense quantities of copper.

Domestic buying is beginning in earnest and a gradual recovery in price to about 16 cents may be expected. It is unlikely, however, that consumers will compete with each other so strenuously to buy copper, that the price will be greatly advanced, as has happened before. A moderately stable price may be looked for.

Secondary Copper

In the year 1921, with large amounts of scrap copper left over from the World War still available, a total of 217,300 tons of copper was recovered as secondary metal, which was equal to about 90 per cent of the virgin copper produced by United States mines. Copper appears in rejuvenated form to a much greater extent than do lead or zinc, and the amount of scrap copper available must be considered by all followers of the copper market.

General Business Depression Seems Improbable

Because of the recent slight slump in business in some fields, notably the construction field, the question has arisen as to whether this was the beginning of a general business depression. The best advised opinion in Washington is that the country is actually fortunate in having a little relief from the rapid ascent of the early months of the year, as this may give an opportunity to catch up slightly with orders and serve to stem the tide towards prices so high as to invite buyers' strikes. The country's business is considered to be passing an economic tableland and not going down grade.

The existing full employment, the absence of stocks of finished materials of almost every kind, and freedom from overproduction, certainly indicate stability. Furthermore, the unprecedented amount of money being distributed in wages represents a buying power that must surely have a tremendous influence in sustaining business. None of the elements of depression seems to be present in the existing situation.

The buying activities of the electric railway field specifically are, of course, very closely tied up with general business conditions. When there is full employment and plenty of money in circulation people ride, and when the opposite condition exists the riding falls off materially. Heavy riding at the generally fair rate of fare now prevailing means good revenue for the railways and a correspondingly active buying, which may be expected to continue as long as there is little unemployment.

As to price levels, while present prices may be slightly inflated, it is out of the question that we can get back to the 1913 levels. The rate of taxation alone would preclude that. It has been the history of industry that the real factors in reducing price levels are the improvement of production methods and increasing efficiency of distribution. Labor will hold the major part of its gains.

Cement Situation Improves

The advice of government officials was sought a few weeks ago by the cement industry in the hope that duplication of orders for cement might be avoided. A survey indicated some twenty to thirty per cent of duplication in orders. This resulted from the fact that every cement mill in the country was booked to full production for many months ahead.

The recent curtailment of buildings, however, has introduced a considerable change in the situation. The Government was considering a curtailment of highway construction as a measure of relief for private industry, for it was thought in official circles that there are certain localities where road construction could well wait rather than to draw material away from needed use under private enterprise. As it has now turned out the reduction in demand for cement which has come from the curtailment of building construction has been tremendously greater than any curtailment in the use of this material which could have been brought about through the recommendation that construction work on public projects be retarded. While it is believed in Washington that even as things now are cement manufacturers would welcome a curtailment in the highway program, such curtailment does not now seem so essential, and there is some hesitancy to take such steps for fear the pendulum might swing back too far the other way.

Metal, Coal and Material Prices

Metals—New York	May 22
Copper, electrolytic, cents per lb.	15.437
Copper wire base, cents per lb.	18 50
Lead, cents per lb.	7 25
Zinc, cents per lb.	6.875
Tin, Straits, cents per lb.	42 125
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$6 875
Somerset mine run, Boston, net tons	3.00
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.825
Central, Ill., screenings, Chicago, net tons	1.87
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$7.75
Weatherproof wire base, N. Y., cents per lb.	19.25
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$1.14
White lead, in oil (100-lb. keg), N. Y., cents per lb.	13.125
Turpentine, (bbl. lots), N.Y., per gal.	$1.225

Rolling Stock

United Railways & Electric Company, Baltimore, Md., will shortly place an order for two single-end Peter Witt type motor cars. This is for the purpose of experimenting with this type of equipment, looking toward the probable purchase of sixty or seventy cars of this type.

Dallas Railway has tentatively approved the proposal of the Supervisor of Public Utilities that the traction company purchase fifty new double-truck standard cars and put them in operation at once to relieve congestion, according to Richard Meriwether, vice-president and general manager. Orders have not been placed for the cars, but the proposal of the supervisor is being favorably entertained.

Birmingham Railway, Light & Power Company has placed orders for twenty new steel cars of the most improved design with the Cincinnati Car Company, according to an announcement on May 17, by J. S. Pevear, president and co-receiver of the company. The purchase, Mr. Pevear stated, will represent a total investment of approximately $300,000. Separate entrances for white and negro passengers are to be provided on the new cars, with effectual separation of the races in the cars. These new cars, it is announced, will be rushed to completion as rapidly as possible and put into service. Cars now in use are being remodeled to meet the provisions of the recently adopted ordinance and settlement between the city and the company.

Track and Roadway

Ford City, Ont.—The Town Council has passed a by-law providing for an expenditure of $83,218 as Ford City's share of the $966,000 scheduled to be spent for electric railway service by the Hydro-Electric Power Commission of Ontario in 1923 in the border cities.

Southern Indiana Gas & Electric Company, Evansville, Ind., has completed work on the improvement of Main Street with 90-lb. rails. The work of laying a new stretch of track about 1 mile long on West Heights, a suburb, will start soon. The company's improvements in Evansville and suburbs this year will total about $100,000.

Lewistown & Reedsville Electric Railway, Lewistown, Pa., will extend its lines from Fountain Square to Mount Rock at the Ort Valley Road. In making the extension the City Council designated that "T" rails be used, that the company remove the snow within twenty-four hours, that a 6-in. thickness of crushed limestone bed be used, that no turnouts be constructed and that lights be provided at the Logan Street extension by the company. The extension is more than 1 mile in length and connects with the traction company lines at Fountain Square. J. I. Quigley, president of the trolley company, plans to begin work immediately.

New York, N. Y.—The New York Transit Commission has awarded to McClintic-Marshall Company, 50 Church Street, the contract for construction of Section 1 of the Flushing subway extension. This company's bid was $679,838, the lowest figure named by eight bidders. This bid, however, is $63,958 greater than that of the Phoenix Bridge Company, to which the contract was originally awarded, but rejected by the Board of Estimate.

Power Houses, Shops and Buildings

Cleveland Railway is building a new storage yard on East Thirty-fourth Street, at which it will store the cars of its rapid transit line and also some other cars, including some tripper cars. This yard will be equipped with an operating inspection shop and other facilities.

Hartford & Springfield Street Railway, Warehouse Point, Conn., through Attorney Harrison B. Freeman, receiver, has petitioned the Superior Court for authority to discontinue the power station at Warehouse Point and purchase energy from the Northern Connecticut Light & Power Company. In supporting his petition at a recent hearing, he explained that the power station was twenty years old and that a saving of $15,000 or more each year could be effected through a contract with the Northern Connecticut.

Dubuque Electric Company through its officials stated that a series of improvements and additions at the power plant, which was started about three years ago, will be carried on for about eighteen months. The program now under way will change the arrangement of the plans about so that the water pumping equipment will be capable of supplying a sufficient supply of water to the boilers, regardless of variations in the river stage. The officials stated that recent improvements would amount to about $300,000. The improvements contemplated will amount to about another $100,000, it was announced. Plans are being considered for breaking ground for a new turbine room within the next ten months. It will be located on the ground near the present power plant.

Trade Notes

Rollway Bearing Company, Inc., Syracuse, N. Y., is the new name of the Railway Roller Bearing Company. This change was effected because of the fact that the trade name "Rollway" under which the company's bearings have been advertised and marketed for the past fourteen years is more generally identified with the company's product than the old name. To care for the increase in the volume of business the company has reorganized.

F. V. Shannon has been appointed western manager of the Massey Concrete Products Corporation in charge of the territory comprising the states of California, Oregon, Washington, Idaho, Nevada, Arizona, Utah, Wyoming and Montana, with offices at 65 Market Street, San Francisco.

Westinghouse Electric & Manufacturing Company announced that it has more than $4,000,000 of orders for the Pennsylvania, Long Island, Southern Pacific, Norfolk & Western and New Haven Railroads. It will build three large electric locomotives for the Pennsylvania, and an additional power house and generating equipment at Long Island City, equipment for forty motor cars for the Long Island, four large electric locomotives for the Norfolk & Western and a transformer station, twelve passenger locomotives for the New Haven and a new generating unit at Cos Cob, Conn., and two large electric locomotives for the Southern Pacific in addition to equipment for eight other locomotives.

New Incorporatior

Houston, Beaumont & Orange Interurban Railway, Houston, Tex., has been incorporated with a capital stock of $450,000. The purpose of the company is to construct an interurban electric railway between Houston and Orange, a distance of about 100 miles. Among the incorporators are: Edward Kennedy and W. V. Kennedy, Houston.

New Advertising Literature

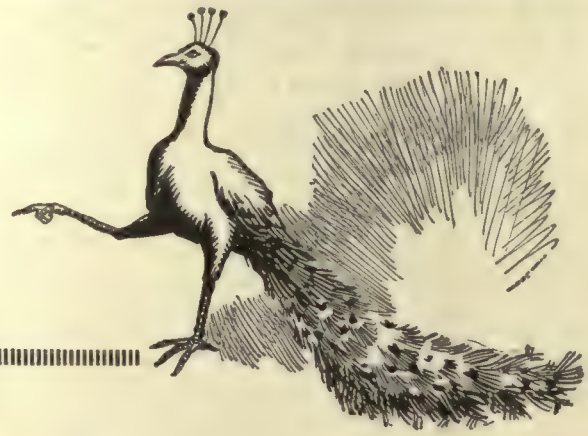
Manganese Steel Forge Company, Philadelphia, Pa.. has issued two new Rol-Man welding rod folders, one for trackwork and the other for mills, mines, furnaces, smelters, etc.

Conveyors Corporation of America, Chicago, Ill., has issued an illustrated booklet showing the construction and application of the American steam ash conveyor which it builds. This concern was formerly the American Steam Conveyor Corporation.

Rome Wire Company, Rome, N. Y., has just issued a new price list on its Super-Service cords and cables. Attractive in form, the list is 3½ in. x 6 in. in size and is printed in three colors. It has had a wide circulation among the jobbers and dealers, and copies will be sent to anyone interested.

Driver-Harris Company, Harrison, N. J., has issued "Data Book R 23 on Alloys for Electrical Resistance." Tables are given showing in detail physical and cost data for Nichrome wires and ribbons, as well as wires and ribbons of other alloys produced by this company. As the name indicates, Nichrome is a nickel-chromium alloy. It is made in several compositions, each particularly adapted to some high temperature uses. This book also contains tables of data, particularly conversion tables.

Are you ordering any new safeties this year?





Overcome the usual objections by equipping one-man cars with

PEACOCK Staffless Brakes

Don't let prejudiced parties stand between your company and the economies you can gain with one-man safety cars. Prove to the public and to your own men that "safety cars" can be made "safe."

Complete safety equipment includes the Peacock Staffless Brake—the hand brake which is specifically designed and built to solve the braking problems of the light-weight Birney type car.

Install Peacock Staffless Brakes. Then take the critics out and give them a practical demonstration on the road, of what you can do with a *properly equipped* safety car. Peacock Staffless Brakes will stop the car when the air brake is entirely cut out. Incorporate Peacock equipment in your original design.

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Lyman Tube & Supply Company, Limited
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Business Established 1894
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TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

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Consultant on Fares, Buses, Motor Trucks
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CREOSOTERS
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Cross Ties — Bridge Timbers
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Treated and Untreated

We solicit your inquiries

Creosoting Plant located
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On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

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THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



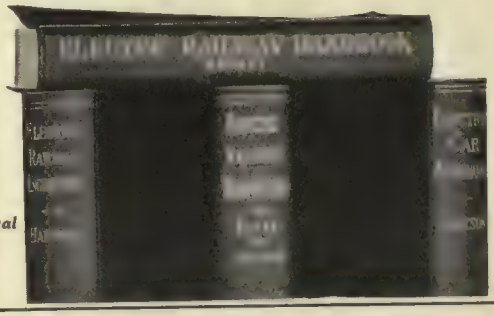
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Here are the four best practical books on electric railway work—giving modern, reliable information derived from the actual experience of practical electric railway specialists. These books point out methods that have proved successful in increasing efficiency and in lowering costs. Apply these sound suggestions and advice to your every-day problems.

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You may send me the Electric Railway Library for my inspection. If the books prove satisfactory I will send $2.00 in 10 days and $3.50 per month for four months—until I have paid the price of the books—$16.00. If the books are not what I want I agree to return them postpaid within 10 days of receipt.

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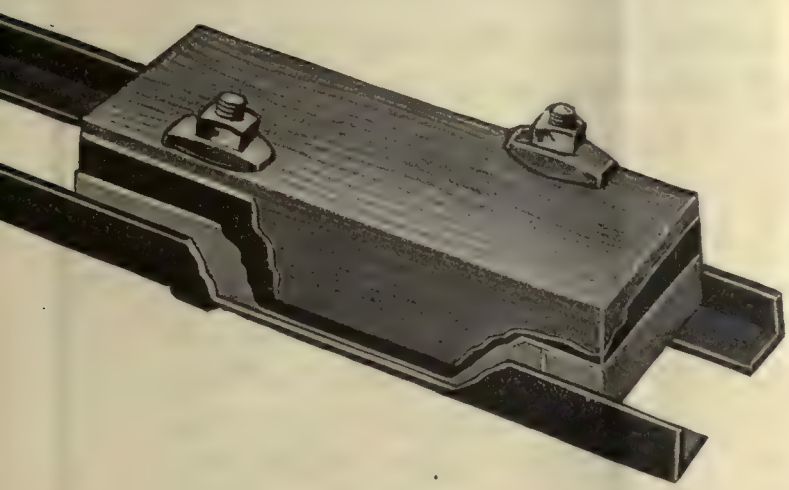


DAYTON

They did not believe they could save $6,000 per mile

—but experience proved that our claim is based on fact

The first cost of track laid on Dayton Resilient Ties is $6,000 per mile cheaper than that laid on wood ties on concrete foundation and $2,000 per mile cheaper than that laid on wood ties on gravel ballast.



RESILIENT TIES will enable you to build *more track* and *better* track for the same money—or the same amount of track for far *less* money.

Consider the saving of $6,000 per mile in concrete roadbed. Considerable. Yet there are reliable figures from Resilient Tie jobs in many parts of the country which supply evidence that this saving has actually been accomplished time and again.

But the mere fact that Resilient Tie jobs *cost less* is not enough. You may also have absolute assurance that Resilient Ties actually provide *better* track than wood ties. Accurate statistics show that not only is maintenance cost greatly reduced, but that the *resiliency* of these modern ties effects a considerable saving in repairs on rolling stock —with less jarring there is less wear, and less wear means longer-lived cars and reduced costs.

Write today
for actual cost figures
on Resilient Tie Track Construction

THE DAYTON MECHANICAL TIE CO.

706 Commercial Building, Dayton, Ohio

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Resilient TIE

— saves first cost !
— saves maintenance !
— saves rolling stock !

How to Insure Sales for Your Product!

The chief asset of any business is the demand for its product. As long as that demand continues, the business is on a sure foundation. But let that demand subside, and every other asset of the business is in danger of becoming a liability.

IN times of prosperity and a rising market there is a general demand for the products of industry that comes to be accepted as a matter of course. It is seldom listed among the assets of the business—it is simply assumed that it will always be there.

But, overnight, conditions may change—as they have done before—and the matter-of-course demand becomes conspicuous by its absence. The business, once strong and flourishing, is suddenly found to be in a very tight place. *The demand had not been insured*—and yet the entire business depended upon its *continuance.*

The modern, economical way to insure the market for any reliable product is by Advertising to the public which consumes it. Advertising creates a steadily increasing number of customers who desire the product, and ask for it by name.

During the present business condition the manufacturers who have insured their demand by Advertising are in a far better position—in every way—than those who have trusted to the current demand that was not of their creating.

[Published by the ELECTRIC RAILWAY JOURNAL in co-operation with The American Association of Advertising Agencies]



"ATLAS" "UNIVERSAL" "RECIPROCATING"

Equipment for Economical Improvement of Track

ATLAS Rail Grinder

An inexpensive rotary grinder especially suited for following up the welders, and removing surplus metal. Light, fast and efficient, simple to operate and satisfactory in its work. Rubber-tired derail wheels permit easy moving.

UNIVERSAL Rotary Track Grinder

Because of its tilting grinding wheel feature it can reach any part of the work, and grind at any angle on the rail head, thus affording accurate finishing to conform to shape of rail.

RECIPROCATING Track Grinder

Recommended by way engineers and roadmasters of leading electric railways as the most satisfactory machine for removing corrugations. So simple mechanically, and so ruggedly constructed that common labor can be employed to operate it.

AJAX
Electric Arc Welder

Highest capacity welder of its type on the market. Furnishes high ampere output even under lowest trolley voltage conditions. A light-weight, simple, easily handled apparatus which will positively afford deep, lasting, satisfactory welds. Arranged for exceptionally thorough ventilation while in operation.

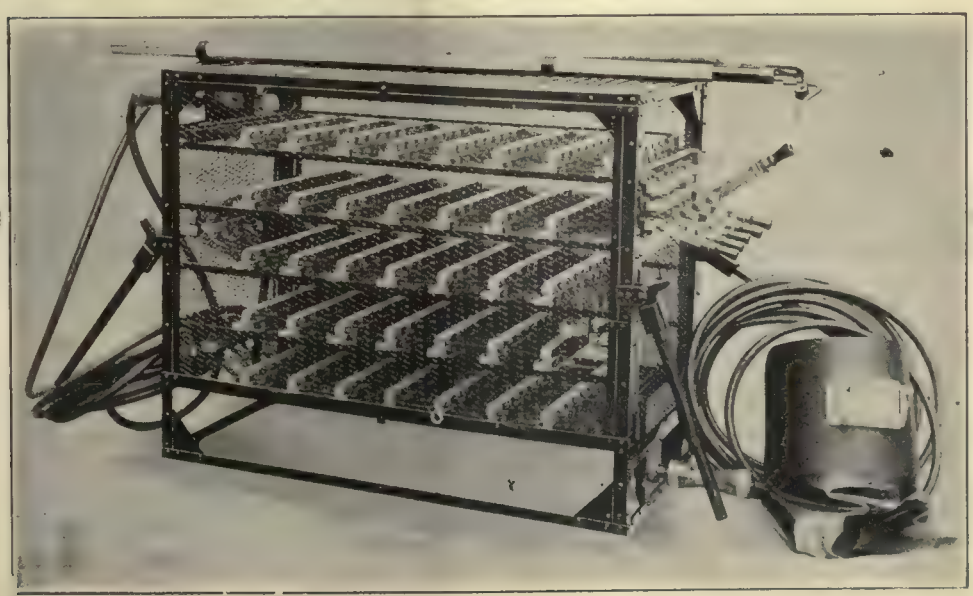
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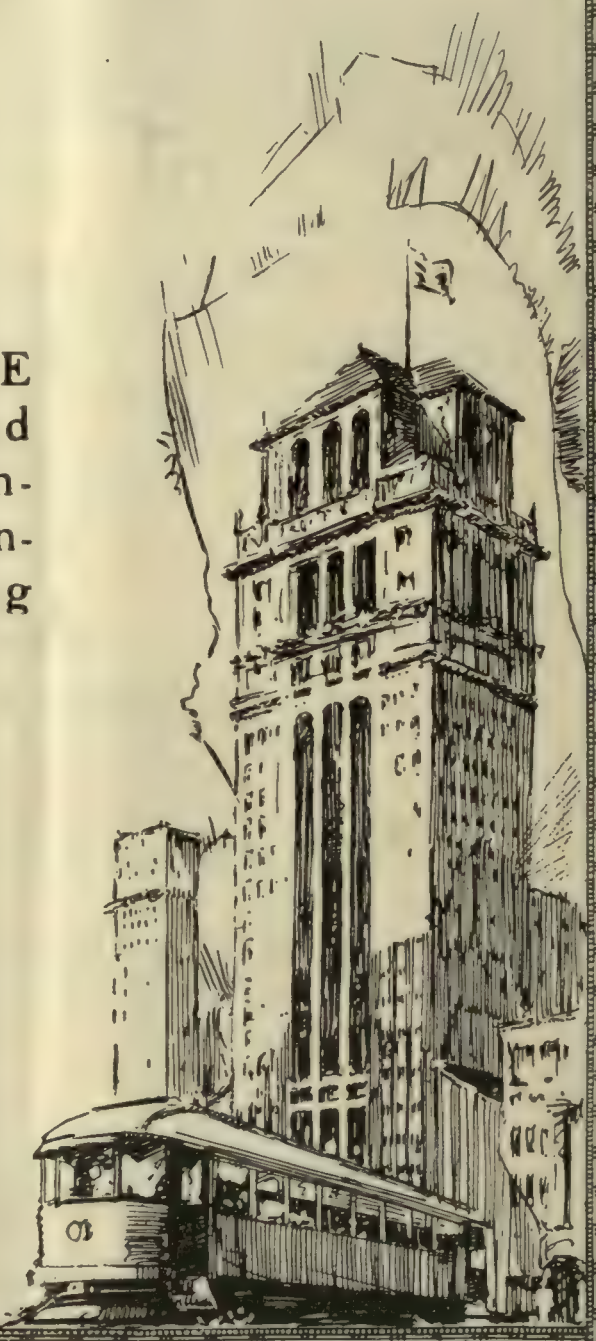
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Barron G. Collier INCORPORATED

CANDLER BLDG NEW YORK



We've heard of *One* man who *doesn't* like "CRATER"

He's a junk man. And his grievance is over the fact that for many years part of his booty consisted of a lot of worn gears and pinions. He doesn't get so many and he feels the loss.

He mourns alone, for the Electric Street Railways are rejoicing in the use of Texaco Crater Compound. For wherever Texaco Crater Compound is used gears and pinions last longer—much longer, which means that gears and pinions stay on the shafts instead of going to the "pile."

And thus a host of savings is rolled up for the Company.

Of course the first and most obvious saving is on the cost of new gears and pinions, due to the increased life of "Crater-lubricated" sets.

Then there is the important item of labor for renewals.

Because of the method we have perfected

Direct Application of Texaco Crater Compound

large quantities of lubricant are saved in regular operation.

Here's how it works:

A small quantity of Texaco Crater Compound is put directly onto the uppermost gear teeth.

A few revolutions and all the teeth of all the gears and pinions are coated with a protective film of Texaco Crater Compound.

This film is enough for perfect lubrication.

It checks wear.

It doesn't hold chips or dirt.

It doesn't fling around the casing.

It stays on the job—on the teeth—for a long time.

When the car is inspected, your men notice the condition of the gears and, if required, they add a little lubricant.

This method has proven itself the most effective and economical.

And you don't waste lubricants—yet you save gears.

And with perfect lubrication, power consumption is proportionately low.

Records drawn from millions of car miles prove value of Texaco Crater Compound—yet if you want to see how it meets the conditions peculiar to the operation of your line, let's hear from you and we'll be glad of the chance to bring home to you a simple method of making many important savings.

There is a Texaco Lubricant for every purpose—
Rolling Stock, Power Plant, Substation everywhere.

TEXACO

THE TEXAS COMPANY

DEPT. R-J. 17 BATTERY PLACE - NEW YORK CITY
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TEXACO



The COLUMBIA Armature Coil Taping Machine

The Columbia Armature Coil Taping Machine saves time and labor wherever it is used. It pulls the tape much tighter than could be done by hand and it does the work many times more quickly.

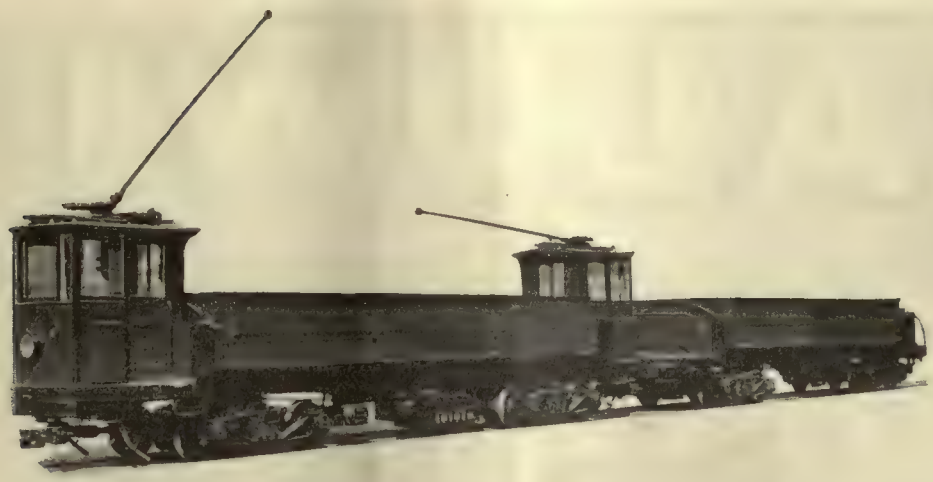
The machine is self-contained, having a friction clutch and an automatic brake which instantly stops it at any point of revolution when the operator removes his foot from the treadle.

The Taping Machine is furnished in iron, bronze or steel with a hardwood work table 24 in. x 36 in.

We will be glad to furnish further information at your request.

COLUMBIA 18 92 MACHINE WORKS

3313 Atlantic Ave., Brooklyn, N. Y.



Cars built by the Differential Steel Company for the Beech Bottom Power Company. The Standard Steel Works Company produced the wheels and axles.

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege if not the practice of all modern manufacturers."
—Vauclain



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BALDWIN



Terminal Station of the Osaka Electric Railway, Japan.

Baldwin Electric Motor Trucks Noted for their Simplicity, Economy and Low Cost of Maintenance

ON a number of the electric railways in Japan, Baldwin motor trucks are standard.

Whether used in heavy high-speed electric railway service, city, or interurban electric railway cars, on cars with long or short wheel-bases, Baldwin trucks may be rapidly repaired in company shops as commercial shapes are largely used in their construction.

Baldwin trucks are built as light as is consistent with strength and are designed to give perfect riding qualities. Full details regarding all types of trucks forwarded upon request.

THE BALDWIN LOCOMOTIVE WORKS

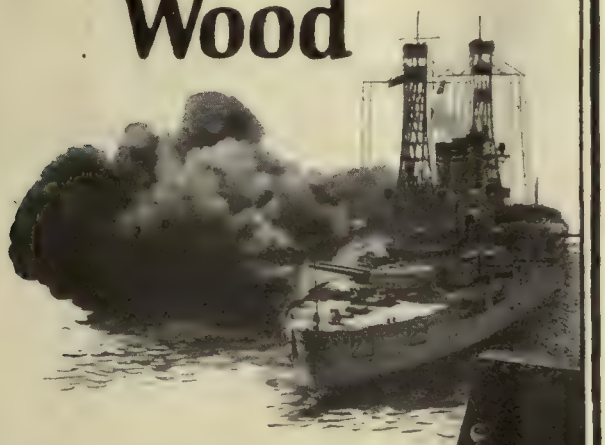
PHILADELPHIA, U. S. A. **Cable Address, "Baldwin, Philadelphia"**

One of the cars on the Osaka Electric Railway—Osaka to Nara—equipped with Baldwin Trucks.



MOTOR TRUCKS

Ebony Asbestos Wood



Where switchboards must stand physical shock!

THE shock of broadside firing literally causes a battleship to jump sidewise—a racking strain on its equipment.

Ordinary switchboard materials might crack under this strain—Ebony Asbestos Wood has the strength to stand it. For this reason, Ebony Asbestos Wood is largely used for modern battleship switchboards.

This strength might be unimportant if it meant a sacrifice in reliability. Fortunately, Ebony Asbestos Wood is not only stronger than ordinary switchboard materials, but has better electrical characteristics, and is lighter, free from flaws, better looking, and more easily worked.

In every phase of electrical work, Ebony Asbestos Wood is giving a far greater protection to the apparatus it mounts.

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Madison Ave. at 41st St., N. Y. C.
Branches in 56 Large Cities
For Canada:
CANADIAN JOHNS-MANVILLE CO., Ltd.,
Toronto

On battleships, in central stations, and wherever switchboard failure would entail heavy losses, Ebony Asbestos Wood is the preferred mounting material.

Through—
Electrical Materials
for
Utilities
Jobber
Contractor
and
Dealer

JOHNS-MANVILLE



Umlambo

Before a Kaffir drinks from a pool he carefully peers into its clear depths to see if *umlambo* is lying in wait for him.

Umlambo being the evil spirit that snatches unwary drinkers, hauls them down and changes them into fish.

It's a commendable practice to *look* into things before you *get* into them.

Of course you can't look into a carbon brush, because it's too dense—therefore greater chance for *Umlambo* to hide.

But you can get a look in on proper brush practice through engineering prescription.

That's the only way Morganite brushes are sold.

They enable you to drink deep of good commutation.

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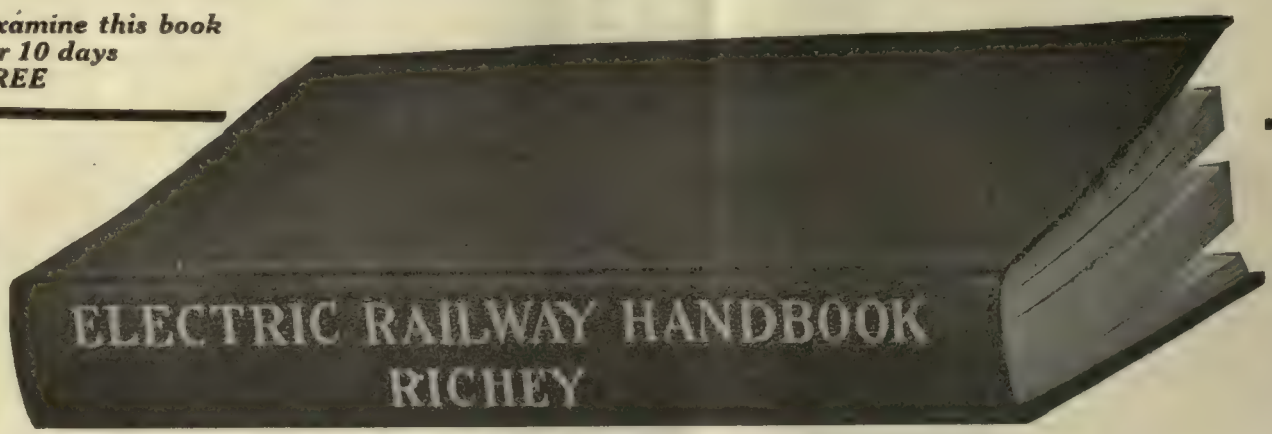
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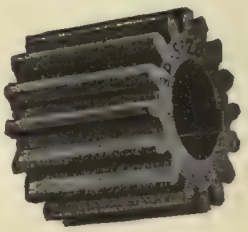
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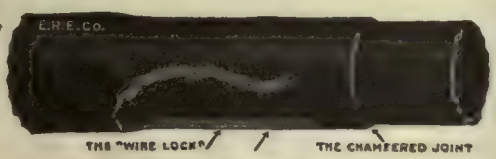
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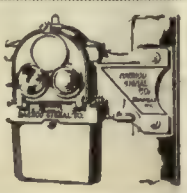
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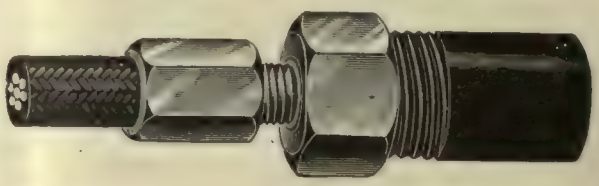
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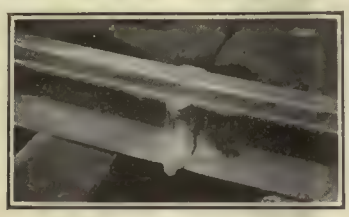
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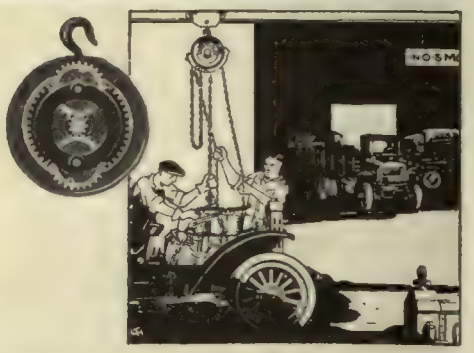
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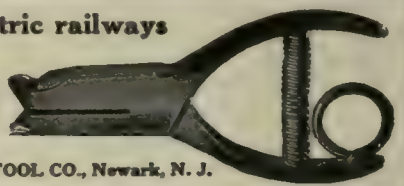
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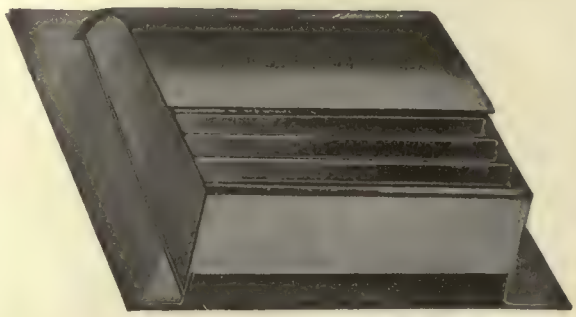
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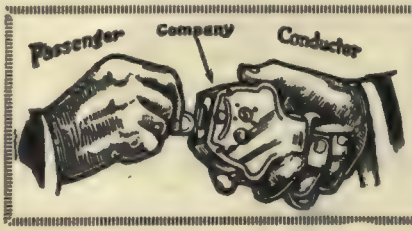
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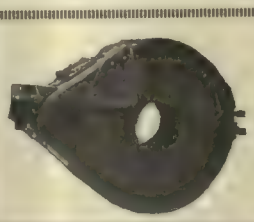
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Electric Service Sup. Co.
Ohio Brass Co.
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General Electric Co.
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Le Grand, Inc., Nic
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Stucki Co., A.

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Stafford Roller Bearing Car Truck Corp.

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Hale & Kilburn
Heywood-Wakefield Co.

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Irvington Varnish & Ins. Co.

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Differential Steel Car Co.
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Wood Co., Chas. N.

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Pantasote Co., The

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Cleveland Fare Box Co.

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Wharton, Jr., & Co., Wm.

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Morton Mfg. Co.
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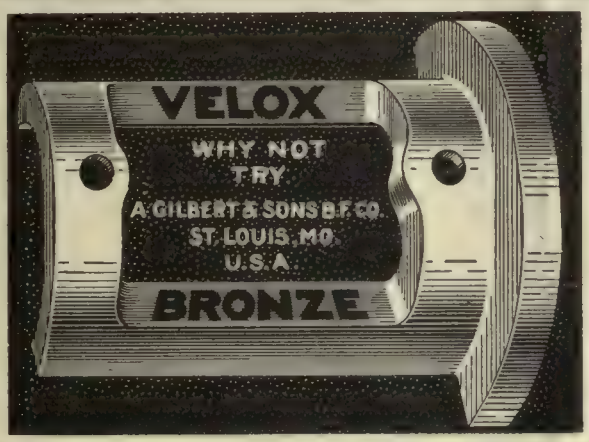


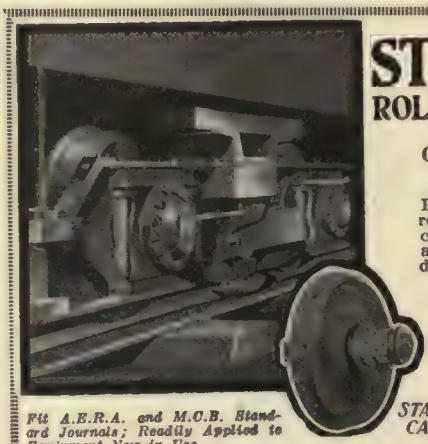
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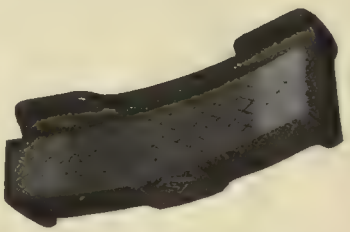
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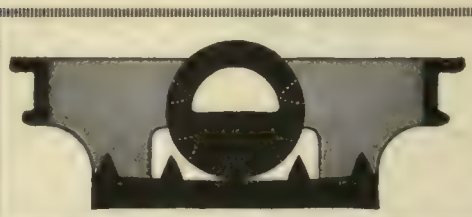
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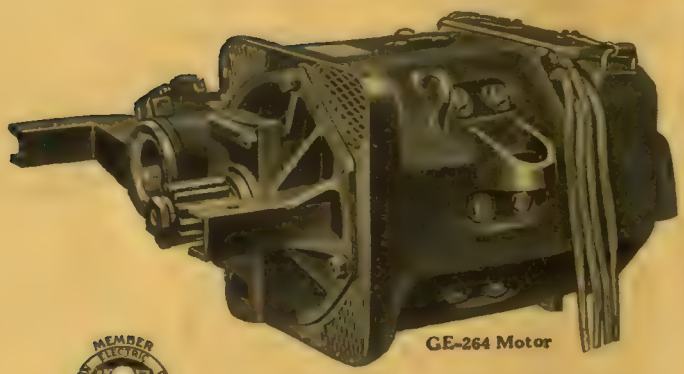
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Consulting Editor

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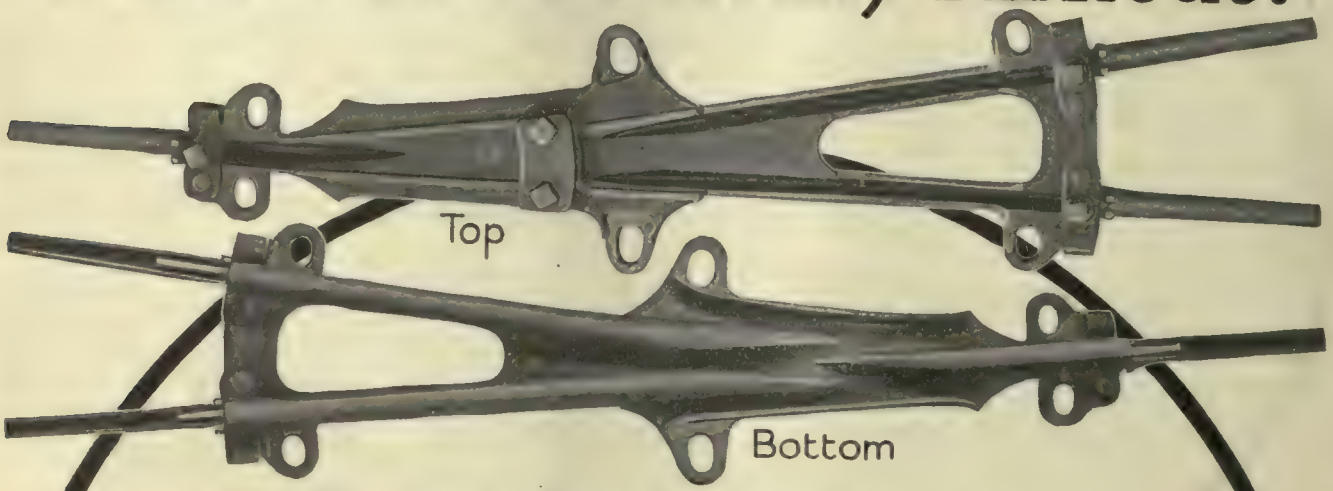
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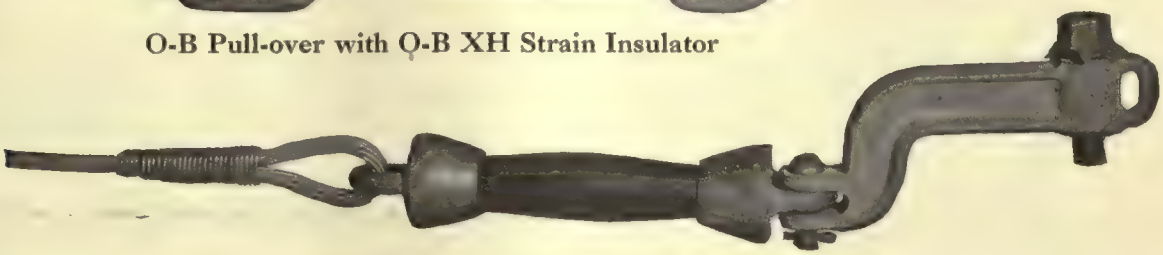
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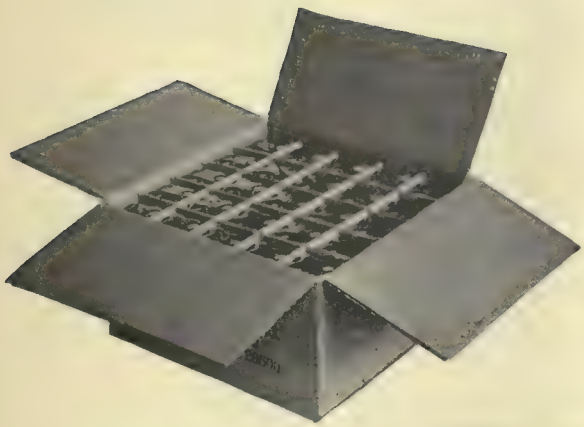


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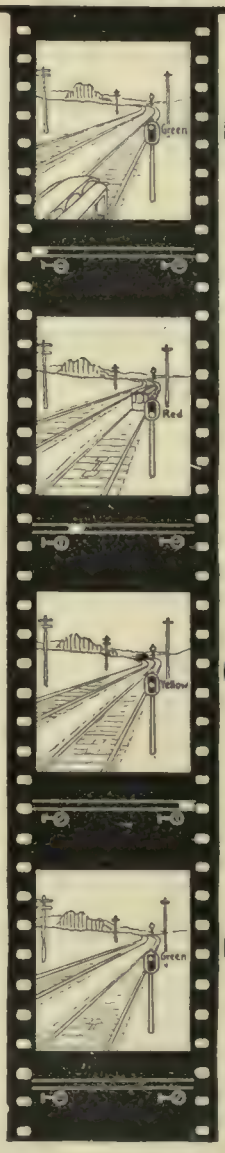
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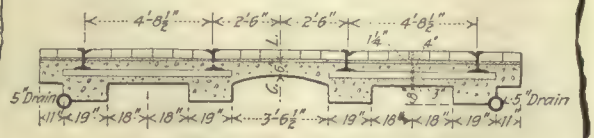
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SWISSVALE, PA.

Steel Tie Track in Youngstown Has Stood Hard Wear

SEVEN years experience with solid concrete and steel-tie construction has convinced the Youngstown Municipal Railway that this type of installation is the most satisfactory for tangent track. All new work, therefore, is being designed along these lines. Nearly



Concrete Construction with 134-Lb. Rail

9,000 ft. of double track was laid on Wilson Avenue in 1916 with monolithic steel-tie construction, and since that time almost no repairs have been needed.

The tangent track is built with 14-in. concrete foundation below the rail. International steel ties are used, together with 9-in., 134-lb. Trilby rail. The paving is of 4-in. Bessemer brick blocks laid on a 1½-in. cushion of sand. All joints are thermit welded. On curves, however, wood ties are used and the joints are not welded. A 5-in. tile drain carries off the water.

The trolley service on this track is fairly heavy, as all city cars, seventy-eight in number, pull out and pull in via Wilson Avenue. Moreover, there is a five-minute headway all day with safety cars, which drops to a two-minute headway in the rush hour, the trippers being heavy two-man cars. Prior to 1920 the all-day service also was operated with large cars, although not on such a short headway as prevails with the present safety cars.

A few joints pulled apart during the first winter after the track was laid, but since then there have been practically no joint failures on the tangent track. An exception should be noted, however, in the case of one joint exactly on the crest of a little hill, which pulls apart regularly once a year when the weather gets cold. With the monolithic construction there has been less trouble than usual because of water getting into the paving.

Since the completion of the Wilson Avenue job, track has been laid with the same type of construction on other streets, and it has proved uniformly satisfactory. A minor variation has been introduced by the use of 7-in. Trilby rail, and the depth of the trench for the foundation has been changed from 8 in. to 4 in. In some places the tile drain has been omitted. However, the monolithic construction with steel ties has been closely adhered to, and new work is being similarly designed.



Track in Good Condition After Seven Years of Service

Hard Wear

Seven Years' Experience

All New Work on Twin Ties

No Repairs Since 1916

No Joint Failures

No Water Into Paving

Uniformly Satisfactory

This article appeared on page 850 Electric Railway Journal, May 19.

The International Steel Tie Company
Cleveland

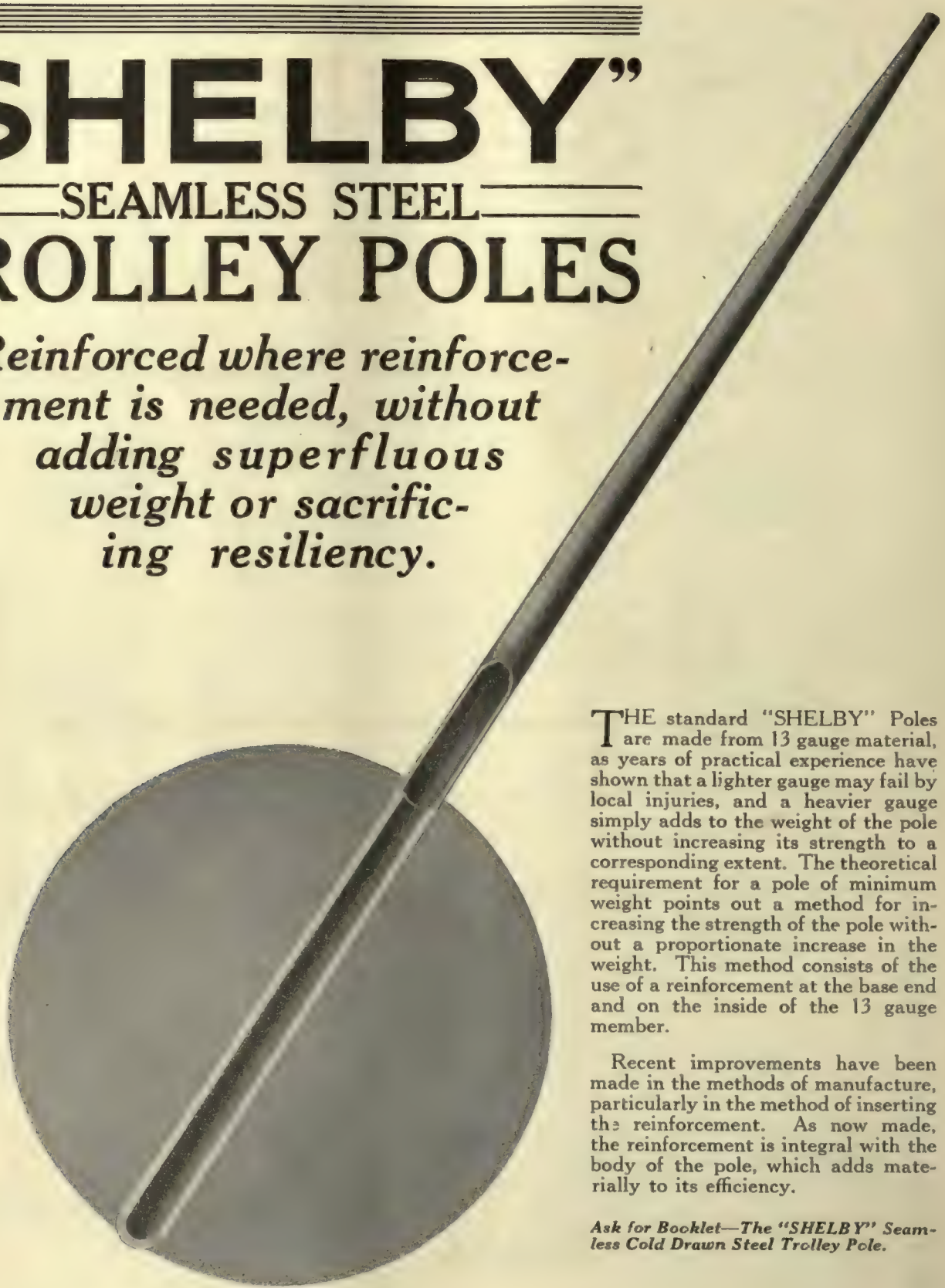
Steel Twin Tie Track

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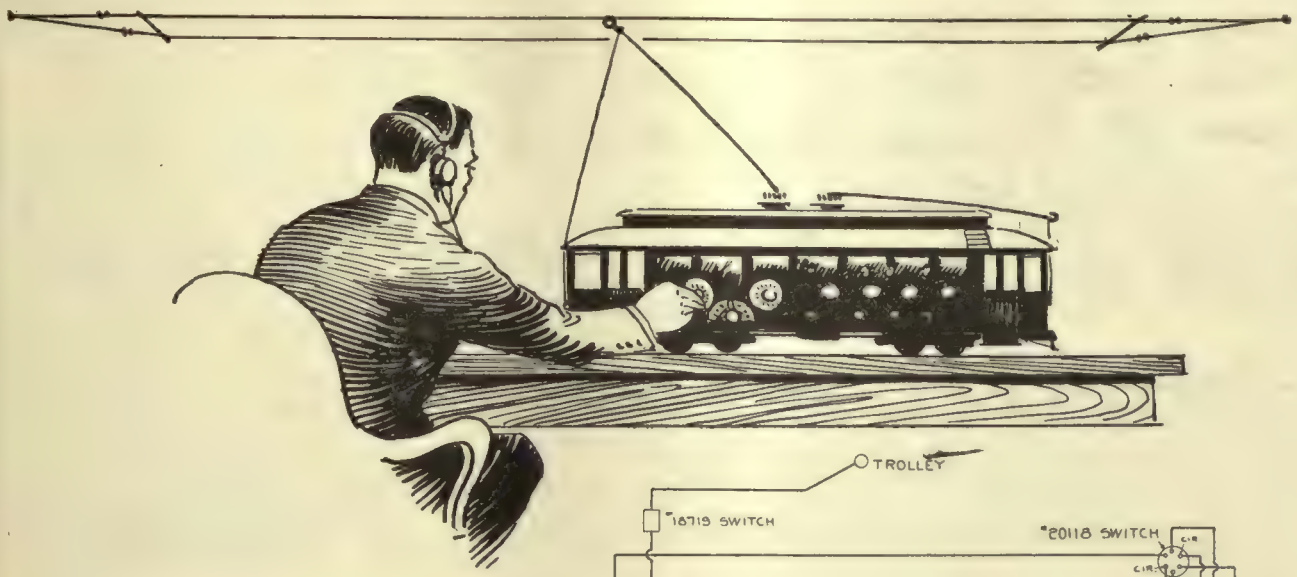
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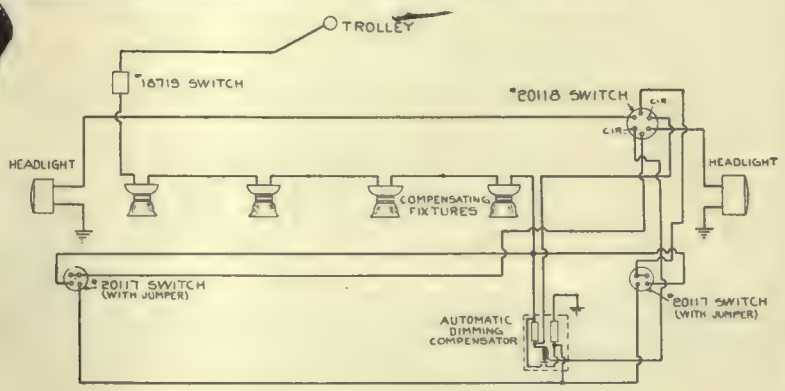
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4—Compensator lighting fixture
2—"Bright" and "Dim" switches
1—DP, DT switches

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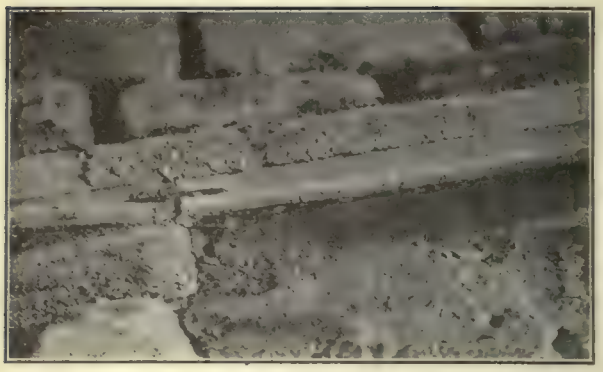
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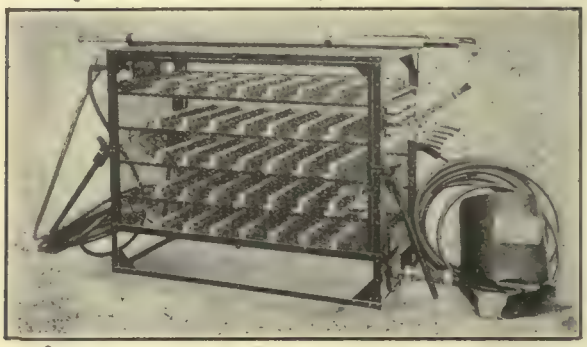
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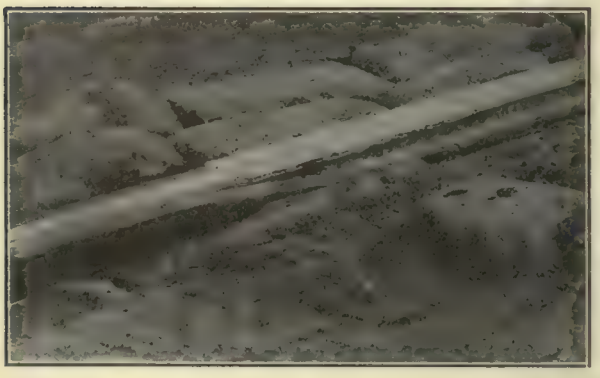
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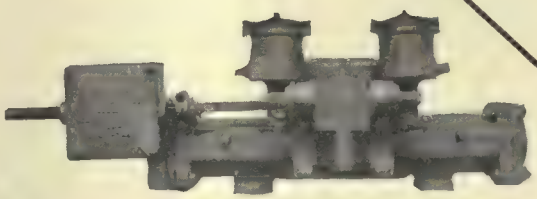
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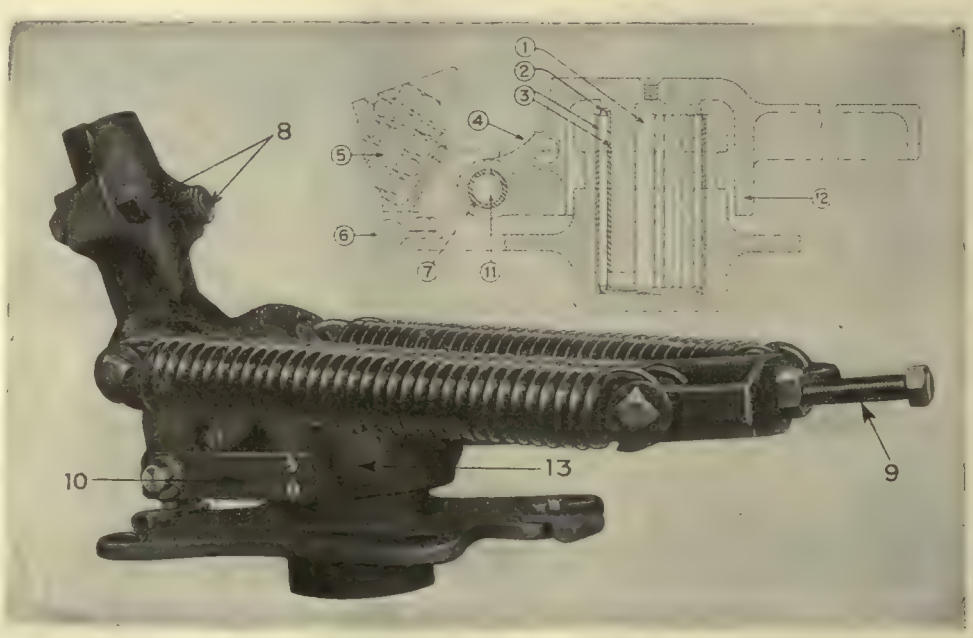
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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61

Track Mileage per Unit of Population Is Liberal in United States

IN THEIR publicity campaigns electric railway managers could profitably emphasize the contrast between mileage per unit of population in this country and elsewhere. For example, from the recent report of the Ministry of Transport of Great Britain it appears that on that island the mileage of electric railway track used in serving the public is 4,275. This is the single-track equivalent of 2,570 route-miles. The population of Great Britain (England, Scotland and Wales) is approximately 43,000,000, so that there are practically 100 miles of single track per million people, or one mile of track per 10,000 people.

In the United States, with its population of, say, 110,000,000 (105,710,620 by the 1920 census), there is a single-track mileage of 47,150. Thus the mileage of single track per million of population is nearly 430, or 4.3 times that in Great Britain. Correspondingly there are only about 2,335 inhabitants per mile of single track.

Of course, mileage is only one element of service, and there is in many places in this country more mileage than the traffic warrants. At the same time, liberal mileage is an indication of readiness to serve. This profusion of mileage is an evidence of the expectation of railway promoters that business would follow the track. It is an inheritance from pre-automotive days, which could not be duplicated under present competitive conditions. Public appreciation of these facts, although it would have no direct bearing on the riding habit, would tend to facilitate the reduction of the paving and other illogical burdens.

A Revival of Interest in the Subject of Paint

EVERY one who has had an opportunity recently to visit various electric railway properties has found renewed interest in the matter of car painting. This may be because for a number of years a great many companies had hardly enough money to paint the cars at all and could select only that pigment and treatment which seemed to promise the greatest protection for the least price. The present revival of interest in the subject may be stimulated by a better realization by the management of the need of improving public relations and of attracting traffic. At any rate much thought is being given by many properties now to the subject of color and color schemes, and much expenditure is being made for paint.

There is no doubt that repainting will make a dingy car much more attractive, and that in this work of repainting a certain amount of ornamentation, striping, etc., is justified. A bright looking car suggests to the passenger a desire to ride, as well also as a feeling that the company wants to give good service in other particulars besides that of the appearance of its cars. It is worthy of note that one of the first steps taken by the Interborough Rapid Transit Company, following its recent voluntary reorganization, was to paint the cars, stations and structure of the Manhattan Elevated Railway a light orange in place of the brown drab color used for so many years. This is part of a campaign by the company to win patronage back to the elevated lines.

Generally speaking, in this renewal of interest in paint for car bodies, there seems to be a reaction against the darker hues and in favor of the brighter and lighter colors, particularly the yellow shades. One advantage of yellow is that it permits the car to be seen readily at a distance, especially in the dusk. Another reason may be that yellow colors are supposed by some authorities to be very durable. Whatever the motive, the practice of keeping the rolling stock well painted is to be commended.

Subways Under Debate in Chicago, Detroit and Philadelphia

THE subject of subway construction has become a very live question in Chicago, Detroit and Philadelphia, and in each city the question has arisen as to the extent to which the proposed subway system should be adapted for the use of surface cars.

In New York, of course, the subways and elevated lines supply purely a rapid transit service. There is no use of either the subway or elevated railway lines by surface cars, and there is no general system of free transfers, as in Boston, between the surface cars and the rapid transit line. The topographical conditions in New York differ also from those in Boston and in the three other cities named. In these four cities the area served is fan-shaped, with a spread of 180 deg. or more, the business district occupying a comparatively small area at the radial focus, whereas the lower half of Manhattan Island, New York's business district, is long and narrow.

In these circumstances it is not surprising that a different kind of subway layout than in New York is desirable and that there should have arisen a demand in some of these cities for a different kind of subway, namely, not long, through routes but shorter lines whose purpose is more to relieve the congestion on the streets of a limited area downtown by putting the surface cars under ground. At the moment, the questions of the actual kind of subway to install and the routes to be followed are more acute in Philadelphia and Detroit than in Chicago. There matters relating to actual subway construction have been rather in abeyance since the Ridgway-Parsons-Arnold report in 1917, but under the new municipal administration the matter will have to be taken up in Chicago right away.

In Detroit the situation is largely the same as in

Philadelphia. The Mayor has appointed a special rapid transit commission to consider the subject. In Philadelphia this committee has reported in favor of a distinct rapid transit system, and in both cities those concerned in the operation of the street railway system have publicly declared their strong preference for some plan which will take the street cars off the streets in the congested center.

Of course, in all this talk about subway construction, the fact should be realized that subways are expensive undertakings at best, and with the present high cost of materials and labor are more so now than ever before. With the congestion downtown in our modern cities, an expensive method of transportation may be worth while. But subways are a luxury and cities with subway aspirations must realize that the conditions under which subway transportation is thought to be given in New York for 5 cents are most exceptional in many ways. A 10-cent fare, as in Boston, is a much more likely charge, if the proposed subways are not to be a serious burden on the taxpayer.

Undoubtedly Chicago and Detroit will work out their subway proposals on a satisfactory basis and Philadelphia will decide on its form for a north and south subway to supplement that now running east and west on Market Street. Subways with elevated railway extensions are necessary in all of these three cities. It is to be hoped, however, that the plans adopted will recognize three principles: The first is that the transportation given should be co-ordinated in service at least, if not in ownership, with the present transportation facilities; second, that provision be made for a sufficiently high fare to pay for the service, and, third, whatever plan is adopted as best suited for existing conditions, there shall be provision for expansion in future along approved engineering lines.

Our Supply of Timber Must Be Conserved

FORTUNATELY for the future of the timber supply in this country there are a few prophets who have the temerity to tell us where we are heading in consuming timber much faster than it is being produced. Prophets of evil are never popular, but when their outspeaking is obviously prompted by unselfish motives they ought to be listened to and their warning ought to be heeded. The United States is so rich in natural resources that the possibility of any of these coming to an end has in the past been so remote that we have gone ahead heedlessly without regard to an ultimate depletion of the supply. It is not remote, however, in the case of timber. Price and quality comparisons of popular species of wood over a period of twenty or twenty-five years tell the tale. An important Eastern railway system reports that it paid for hemlock in 1904 $24 per thousand feet, board measure, whereas the price is now $63.50. The corresponding prices for white oak are $70 and $160. Unfortunately also while price goes up quality goes down, and for the same reason, namely, that good timber is hard to get. Shifting from the previously plentiful hemlock and white oak to cedar, pine and fir is only a temporary remedy. These woods will not last forever.

Increasing prices and difficulty in getting good timber form the principal correctives of present conditions. They bring preservative treatment into the range of economic practicability, and they stimulate the development of substitutes and the art and science of forestry. The preaching of the prophets will be most effective when, in addition to telling the industries why prices are high and quality low, it gives full information as to the availability and characteristics of preservatives and substitutes. On the other hand it is the duty of timber users to investigate these things to learn if they are using the best practices.

Sentiment will not greatly affect the deplorable timber situation, except as it bears a relation to economics. Given full information, however, timber users will gradually adapt themselves to the changing conditions and will bring pressure to bear upon the government to push reforestation. Scientific forestry as a private business rather than a public concern will also come in due course, but only when timber prices are much higher than they are now.

How Can Surface Car Trains Best Be Motorized and Controlled?

THE advantages of two-car trains have been recognized for years. Trains save man-power and electrical energy, and get through street congestion with less difficulty than when the same number of cars are run as separate units.

Two different methods of train operation are practically standard. The first is to use heavily-motored cars to haul dead trailers, and the second to couple together motor cars equipped with multiple-unit control. The first method is simpler and the first cost is less, but the available power, if sufficient to be satisfactory for train service, is too great when the motor car is operated alone and the all-day efficiency is relatively low. The second plan gives a better distribution of the motor capacity and a higher all-day efficiency, but the first cost is greater and the complication of mechanism considerably increased. It has the advantage, however, that the motor capacity may be divided between the cars in a ratio dependent on their duty. For instance, four motors on the car intended for all-day service and two on that used in the rush periods only has been found a satisfactory division of the power. The control equipment, however, usually is identical on all cars.

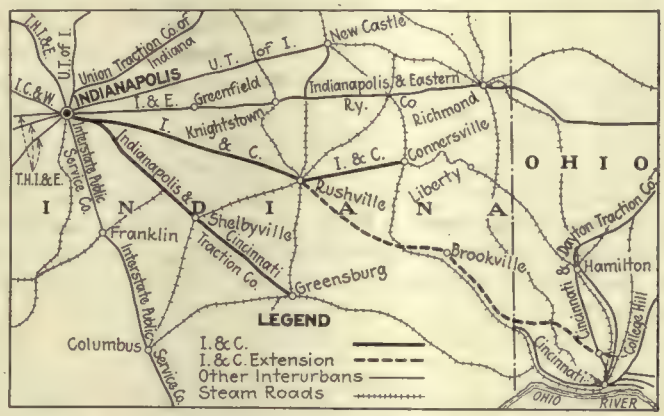
In order to get the advantage of motor capacity correctly apportioned for the work each car has to do, without the expense incident to independent control for the car used only a few hours a day, a new type of two-car train described in this issue has been developed by the Pittsburgh Railways Company. This result has been accomplished by equipping the second car with two motors without control. The arrangement for connecting the electrical equipments is very simple, only three wires being needed in the train line. The performance is as good as that of any other train with motors properly chosen for the work.

The great objection to this arrangement is that the second car of the train, though motorized, remains a trailer. Having no control nor trolley pole, it cannot be operated independently, and about the yards or shops it must be handled by a live car in the same manner as any true trailer. The engineers who developed this car did not consider this disadvantage serious enough to outweigh the simplicity, light weight and low cost gained by this arrangement. It will be very interesting to note whether or not this opinion will be borne out in practice, as the view usually taken is against the use of non-mobile equipment.

Economics of I. & C. Re-equipment

Indianapolis & Cincinnati Traction Company to Be Changed Over for Direct-Current Operation—Improved Car Designs and Progress in Automatic Substation Development Major Factors in Justifying Change—Estimated Savings Equal 14 per Cent Return on the Additional Investment

ABOUT eighteen years ago the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., equipped its lines for operation at 3,300 volts, single phase, 25 cycles. At that time the outlook was favorable for a general extension of alternating-current service for electric interurban work in the Middle West, and the adoption of this type of equipment on this system was followed by a period of high-grade service which met the requirements of the territory reasonably well. Recent developments in motors and automatic substations, however, and excessive costs of operation with this early alternating-current car equipment have thrown new light upon the relative economies of alternating and direct current service. President Charles L. Henry and other officials have lately been giving considerable thought to the possibilities of changing over the system for direct-current operation, and a few weeks ago Prof. Albert S. Richey of the Worcester Polytechnic Institute, Worcester, Mass., was requested to investigate the problem and report upon it. The company's decision to make the change followed Professor Richey's favorable recommendation. The directors of the railway approved the project on May 15, as was noted in the JOURNAL for May 19. Since then contracts have been let totaling $736,146, as follows:



Present Route of Indianapolis & Cincinnati Traction Company and Proposed Extension to Cincinnati

To the Westinghouse Electric & Manufacturing Company, which originally equipped the road, for the complete motor, air brake and control equipments for twelve new motor passenger cars, and four extra motors; four complete equipments for freight motor cars, and the full equipment for eight automatic substations, one semi-automatic substation and one portable automatic substation. The details of this order, type of equipment, etc., appear in two items on page 948.

To the Baldwin Locomotive Works for twelve pairs of passenger car trucks.

To the Cincinnati Car Company for twelve all-steel car bodies.

To the Western Electric Company for 37.7 miles of 500,000 circ.mil and 62.4 miles of 300,000 circ.mil cable.

Additional work of rearranging the present transmission lines and putting up new 600-volt feeder cable, which will be done by the company, is estimated to cost $42,000. The total actual cost of the changeover will therefore be $778,146.

The system at present consists of two lines, one route being from Indianapolis to Rushville and Connersville and the other from Indianapolis to Shelbyville and Greensburg. Cars are operated into and out of Indianapolis over the direct-current, 600-volt lines of the Indianapolis Street Railway, and the two lines of the interurban system branch from a junction about 4 miles from the center of the city. From Indianapolis to Connersville the distance is about 58 miles and to Greensburg about 49 miles. It is proposed to extend the interurban system from Rushville 73 miles to Cincinnati, reaching a downtown terminus at Canal and Walnut Streets. The proposed change to direct-current service will be made with this extension in view, all present engineering designs having been established as a part of the ultimate development of through electric transportation by high-speed rolling stock between the terminal cities for which the company is named. In fact, the decision to proceed with the changeover of the present system for d.c. operation was made conditional upon two things: First, that nothing should be done on the present system except that which would fit in as a part of the complete extended system, and, second, that whatever is done must be carried out in such a way as to avoid any additional cost resulting from doing the work in two parts. But from the very thorough study made, it appears that the changeover of the present system will result in a return of over 14 per cent on the additional investment whether the line is ever extended to Cincinnati or not.

How Changeover Was Financed

An interesting thing about the financing of this work by the Indianapolis & Cincinnati Traction Company is that the money was entirely arranged for and in the bank before any contracts were let. The project was financed by J. F. Wild & Company, a local state bank and investment banker, through the issuance of 6 per cent equipment trust certificates for the principal amount, and with a cash payment ahead of this equal to 20 per cent of the entire cost of the equipment. Against this equipment trust the bankers will issue preferred and common stock, which will be sold locally.

It will not be possible to get an entrance into Cincinnati until the latter part of 1924, because the new rapid transit and interurban loop which is being built by the city will not be ready prior to that time, but when through service between Indianapolis and Cincinnati can be established, it is estimated from a study made by engineers and by Mr. Henry that it is safe to expect sufficient earnings to pay present fixed charges, 7 per cent on the new money necessary to complete the

line, and have sufficient remaining to pay 5 per cent dividends on the present $1,000,000 of preferred stock and 5 per cent on the present $2,000,000 of common stock. This is thought to justify the anticipations of the men who organized the project originally.

The company has had a hard time during the years it has been waiting to get a satisfactory entrance into Cincinnati and has barely paid fixed charges and operating expenses. In 1922 it fell $10,000 short of paying these. Prior to the plan to build the rapid transit and interurban loop in the bed of the Old Miami Canal there has been no way of gaining entrance to the city on any practical basis, on account of the wide gage of the local car lines, excessive cost of separate tracks over streets not occupied by the local lines, the resulting slow operation on the surface, etc.

The Entrance Into Cincinnati

The Miami Canal was leased to the city by the state under a specific condition that it be used for transportation purposes, and with the further specification that the track must be of standard gage and that interurban railways must have the right to use the track for reasonable rental. It will be under the control of a rapid transit commission appointed by the city. The loop will be 17 miles in circumference when completed. Of this 10 miles is now contracted for, including subway construction for part of it. When this first section of the loop is completed it will give the interurban a connection into the heart of the city, the terminus at Canal and Walnut Streets being only four squares from the Gibson Hotel.

The plan of the interurban will be to build 64 miles of new line from Rushville, Ind., to College Hill, Ohio, where connection will be made with the Cincinnati & Dayton Traction Company. Operation will continue over this company's line for 4 miles to the point of connection with the canal bed loop, with 5 miles over the loop to the terminus. As the distance from Indianapolis to Rushville is 41 miles, this gives a total distance from the center of Indianapolis to the center of Cincinnati of 114 miles, which can be easily handled in a three-hour schedule.

Following are given the engineering, economic and operating considerations which led to the decision to make the present change from a.c. to d.c. operation, in preparation for the extension through to Cincinnati. This is largely taken from the report prepared for the railway by Professor Richey.

Reasons for Changeover and Results Expected

The interurban lines of the company are at present supplied with energy from a two-phase steam generating plant at Rushville. Energy is generated at 2,300 volts, transmitted at 33,000 volts to transformer stations and delivered to a No. 0000 trolley at 3,300 volts, single phase. Nine transformer substations are at present in service, the average distance between those on the Cincinnati division being 10.8 miles and the maximum 11.88 miles, the corresponding figures for the Shelbyville division being 11.8 and 11.96 miles.

The principal, if not the only, serious handicap under which the present operation of the system is being conducted centers around the deficiencies of the single-phase, alternating-current equipment. At the time of installation (1905) there was every evidence that the system was entirely proper for an interurban road of this character. Since then very great improvements have been made in direct-current railway operation, including the development of the interpole and self-ventilated motor, the simplification of control apparatus and the satisfactory development of the automatic rotary converter substation. Similar favorable developments have not been made in alternating-current apparatus, and for these reasons there is at present no question as to the superiority of the direct-current system for this class of work. The alternating-current system would not be considered today on a road of this character. Further, the time has been reached in the history of this road where the differences in operating costs between the two systems will pay a good rate on the money required to make the change to direct-current operation. This change involves the following:

1. Change of motors and electrical equipment on the cars.
2. Installation of substation apparatus for the supply of direct current.
3. Rearrangement of transmission lines so as to supply three-phase energy to the rotary converter substations.
4. Change in power supply to three-phase, 60 cycles.

While making the necessary changes as outlined above, a further very desirable change is that of the passenger cars themselves to take advantage of the development of the modern steel car with its lighter weight and reduced maintenance costs.

Standard pressures for direct-current operation of roads of this character are 600, 1,200 and 1,500 volts. It was not difficult in this case to determine upon 600 volts, as there are numerous connecting city and interurban lines in this territory, all of which have standardized on 600 volts.

The benefits which will be derived from the proposed change to 600-volt direct-current operation are:

1. A relief from trying delays at present experienced due to failures of various kinds in connection with the single-phase car equipments.
2. A very considerable reduction in the power consumption of the cars and a consequent saving in power costs.
3. A very material saving in the cost of maintenance of cars and car equipments.

Lighter Cars with Greater Capacity

An incidental but very important feature of the change will be the introduction of new and more comfortable rolling stock, which, in connection with the improved schedules, should result in a very material increase in traffic and earnings. The twelve new all-steel combination passenger cars will be somewhat larger but considerably lighter in weight than the present rolling stock. The proposed car will be 60 ft. long over all, with a seating capacity of fifty-four. It will weigh about 36 tons completely equipped. Baldwin trucks are to be used with improved design over those already in service. The motors proposed for the new cars are of 105-hp. rating, the present motors being of 100 hp. capacity, but nearly twice as heavy as the new ones. The slightly increased capacity of the motors and the considerable reduction in car weight give the proposed motor a very decided margin of capacity over the requirements. This will permit of occasional trailer operation and will result in much lower maintenance costs than in cases where the capacity margin is small. The cars and equipment as proposed will be suitable for interchanging in all the present local and high-speed passenger service and the future local service on the Cincinnati extension. With the latter completed, the through express service will be supplied with new,

larger cars, specially equipped for this service, including 140-hp. motors, the same as specified at present for the freight cars.

The all-steel bodies and the modern motors will result in a very considerable saving in maintenance costs, while the lighter weight of the complete car and the better efficiency of the motor equipments will result in a material decrease in power consumption. A comparison of the weights of the present and proposed cars follows:

	Present	Proposed
Car body, without electrical or air-brake equipment	43,400 lb.	33,000 lb.
Trucks, without motors	19,680 lb.	22,000 lb.
Four motors	24,480 lb.	12,700 lb.
Electrical and air-brake equipment on car body	15,460 lb.	4,515 lb.
Total weight of car	103,020 lb.	72,215 lb.

It is proposed to use the present car bodies and trucks for freight service and to equip four of these cars with new direct-current motors of the same type as proposed for the passenger cars, but of 140 hp. capacity. These motors are the same, with the exception of gearing, as would be used in the high-speed express service on a through line to Cincinnati, so that when this line is built the motor equipment would be standardized on the two sizes of 105 and 140 hp. The plan is to leave the present motors on two of the freight cars with a change in control apparatus, which will consist mainly in the removal of the transformer and other single-phase equipment and will involve operating the single-phase motors connected permanently in groups of two in series for direct-current operation. While these equipments will be less economical and somewhat heavier than new direct-current apparatus, it is believed advisable to retain them in service for line car and occasional freight use. The mileage operated with these two cars will be small, and until the freight business requires more cars in regular operation these single-phase motors will operate satisfactorily.

Full Automatic Substations to Be Used

One of the principal drawbacks in the use of direct current for a road of this type has been the labor cost of operating substations with rotary converters. Until the last few years each substation required a man in constant attendance, at least two men per substation for twenty-four-hour operation. Lately, however, automatic switching apparatus has been developed and tried out to such an extent that it is now entirely safe to rely upon it. The fixed charges on its additional first cost and the maintenance expenses are so much less than the former labor cost that its use is unquestionably advisable in such a case as the Indianapolis & Cincinnati road. If the substation is located where a man is available for the occasional operations of starting up and shutting down, the automatic apparatus may be reduced considerably in cost; such equipment is known as "semi-automatic." The present plans of the company include full automatic substations at all locations except Rushville. Here the installation will be in such close proximity to the shops that a semi-automatic equipment is proposed.

The present transformer stations are located along the lines at intervals of about 10 to 12 miles. These are suitable for the location of 600-volt direct-current substations under present service conditions. When through operation to Cincinnati is begun the required substation interval will be about half these distances, with the same substation capacities.

These capacities chosen for the new direct-current substations are 500 kw. each for the four substations between Indianapolis and Rushville and 300 kw. each for the five remaining substations. The present buildings are adaptable without change for the indoor apparatus of the new substations. A portion of the new equipment, consisting of transformers and high-tension switching apparatus, is designed for outdoor installation on land available immediately adjacent to the substation buildings.

As every substation is equipped with but one rotary converter, it is proposed to install a complete 500-kw. rotary converter automatic substation in one of the present passenger cars for use as a portable substation. This may be utilized in case of breakdown at any of the permanent substations or for any increase of capacity which may temporarily be required at any point where there are sidetrack facilities.

The present transmission lines are insulated for 33,000 volts, but are single-phase lines. One set of two wires extends from the power plant to each substation on the Rushville division and two sets of two wires each extend across country to Shelbyville, with four wires between Shelbyville and the adjacent substations in each direction, extended by two wires to the terminal substations on the Shelbyville division. This gives transmission lines in various sections consisting of from two to six wires. Under the new conditions a three-phase line of three wires will be required over the entire system. This will involve in some places taking down three wires, in some places one, and in others the erection of one additional wire, besides some additional three-wire lines. The size of the wire and the insulators at present in use is satisfactory, and unnecessary wire which comes down can be used almost entirely for the new circuits where such are necessary. While the present transmission line insulators are satisfactory, it is doubtful whether those not necessary under the new arrangement could be moved satisfactorily to new locations, and the cost estimates of the change to direct current include new insulators for the new construction.

With the source of power supply at Indianapolis for the divisions as at present operated and at or near Cincinnati for the Cincinnati extension, 33,000 volts is satisfactory for the three-phase transmission, which enables the present wire and insulators to be used.

Direct-Current Feeder Requirements

With the present distribution pressure of 3,300 volts, no supplementary feeder is required for the trolley wire. With direct-current distribution at 600 volts, it will be necessary to provide a supplementary copper feeder of 500,000 circ.mils between Indianapolis and Rushville, using one of 300,000 circ.mils on the balance of the line. The estimates of cost were based on a copper price of 20.9 cents per pound for this class of cable; the final contract for the purchase has, however, already been made at a considerable reduction on account of a lower stage in the copper market.

The present power plant at Rushville is well designed, efficient and reliable considering its capacity. It has been demonstrated, however, that for a road of this character it is nearly always possible to purchase power cheaper than it can be generated, principally on account of the better diversity factor and the load factor of a much larger station. The present generators at Rushville are two-phase, 25-cycle units, while the direct-current substations require three-phase, 60-cycle current. There seems no doubt that it would pay to arrange to purchase energy for this system rather than to make the expenditure necessary to convert the Rushville station, and the estimates are based on the plan to

purchase energy at a conservative figure of 1.25 cents per kilowatt-hour.

Due to the proposed change from 25-cycle to 60-cycle service, and also to the elimination of the 3,300-volt alternating current now used on the trolley wire, it will be necessary to change some transformers in the service of distributing local light and power, and it will also be necessary to change some of the apparatus, such as motors, in the service of power customers. It is estimated that this outlay will not exceed $10,000.

Annual Charges

In Table I is given an estimate of the costs which will be incurred to re-equip the road as above described. These estimates make no provision for salvage on existing equipments. It is probable that there is no salvage value in the electrical equipment of the present passenger cars except the junk value of iron and copper, and no attempt has been made to estimate this junk value. It is considered possible that the steam and electrical equipment of the Rushville station, which is two-phase, 25-cycle apparatus, may net from $75,000 to $100,000 salvage, but the estimates show that it will pay to make the change to direct-current operation, even without allowance for salvage.

Table II shows the estimated operating costs which will be affected by the proposed change to 600-volt direct-current operation, together with the estimated comparative figures under the new operation. The proposed change will have no bearing on nor should it affect any of the operating accounts not shown in this tabulation.

The operation which will be affected by the proposed change has been grouped under the four headings of power, substation operation, maintenance of cars and maintenance of track. The direct power generation costs are shown as completely eliminated, as well as the item of power station depreciation. The latter will be eliminated if and as soon as this equipment is done away with by substitution of purchased power and without question as soon as it is sold and removed. The power station building is admirably adapted for use as a shop and may be employed to advantage for this purpose whenever increased shop facilities are required, although this will probably not be until the road is extended to Cincinnati.

The cost of power under the proposed plan is based on careful estimates of the power consumption of the new car equipment, a car-mileage as at present operated, an amount of commercial power the same as at present and an estimated cost of 1.25 cents per kilowatt-hour for the purchased power.*

Under the head of substation operation, the present direct operating costs are eliminated and replaced by the cost of an inspector and repairman who will cover all substations, plus an estimated cost for maintenance of substations. The present direct cost of car maintenance, which is excessively high, has been eliminated and replaced by conservative estimates of the maintenance of steel passenger cars with modern direct-current equipments, based on the present mileage and 3.2 cents per car-mile. This figure is at present being attained by interurban roads in Indiana with cars and equipment not so modern as those here contemplated.

The maintenance of freight cars has been taken at the present mileage, but at a larger figure of 3.6 cents per car-mile on account of the wooden bodies and because of the fact that it is proposed to continue the operation of some of the single-phase motors. There is no doubt that there will be some reduction in the cost of track maintenance due to the reduction in weight of car equipment. It has frequently been estimated that 40 to 50 per cent of track maintenance costs are in direct proportion to the weight of cars, but in the present case an allowance of 30 per cent has been made, showing an estimated annual saving of $4,300.

The savings computed, with allowance for additional substation operating costs, amount to $142,280, which may be applied on depreciation of the new equipment and interest on the new investment. Allowing 4 per cent depreciation on the entire new investment, there remains $110,867 as the net saving in operation due to

*The actual cost of energy for the year 1922 was 2.16 cents per kilowatt-hour, and it is now expected that the purchased energy will be obtained for 1.4 to 1.6 cents per kilowatt-hour.

TABLE I—ESTIMATED COST TO RE-EQUIP SYSTEM FOR 600-VOLT DIRECT-CURRENT OPERATION

Passenger Cars—	
12 Passenger cars, including installation cost of trucks, air brakes and electrical apparatus	$190,236
12 Pairs trucks	35,000
12 Four-motor equipments, 105-hp. motors and control	89,400
4 Extra 105-hp. motors, at $1,500 each	6,000
12 Air-brake equipments for passenger cars, at $1,044.60 each	12,535
Freight Cars—	
4 Four-motor equipments, 140-hp. motors and control, at $9,456 per set	31,526
2 Extra 140-hp. motors, at $1,750 each	3,500
Installation of motor and control equipment, at $675 per car	2,025
1 Air compressor at $656, plus installation, $100	756
Substations—	
5—300-kw. rotary converter substations with complete apparatus for full automatic operation, at $15,025	75,125
3—500-kw. rotary converter substations with complete apparatus for full automatic operation, at $19,097	57,290
1—500-kw. rotary converter substation with complete apparatus for semi-automatic operation	16,850
Erection, installation and testing of nine substation equipments, including outdoor transformer foundations, including $1,540 for protective fences, etc.	27,500
1—500-kw. rotary converter automatic substation apparatus, installed in present passenger car for portable substation	20,000
Electric Light and Power—	
Cost of converting transformers and customers' apparatus	10,000
Overhead Lines—	
Material for changing over transmission lines from single-phase to three-phase, 2,286 poles at $10.75 per pole	24,575
Labor for taking down transmission wire from 54.8 miles, at $150 per mile	8,220
Labor for installation of transmission wire on 45.5 miles, at $250 per mile	11,375
Material for new three-phase transmission lines from Hoffman and New Bethel to Junction, 500 poles, at $5.40 per pole	2,700
Labor for new three-phase transmission lines, 10.5 miles, at $300	3,150
Direct-current feeder, bare copper strand, 37.7 miles 500,000 circ.mil and 62.4 miles 300,000 circ.mil	128,570
Material for installation of 600-volt feeder, 4,950 poles, at $1.21 per pole	5,990
Labor for 600-volt feeder	20,000
Supervision—	
Supervising and erection engineer	3,000
	$785,323

TABLE II—COMPARISON OF PRESENT ANNUAL OPERATING COSTS WITH ESTIMATED COST OF OPERATION WITH PROPOSED DIRECT-CURRENT EQUIPMENT

	Present	Proposed
Power—		
Operating costs, 1922, coal, labor, repairs and miscellaneous expense	$146,843	
Depreciation charges	35,768	
Cost of purchased power, 1,337,000 (1922) car-miles, at 3.75 kw.-hr. per car-mile plus 481,000 (1922) kw.-hr. light and power, at 1.25 cents per kw.-hr.		$68,684
Substation Operation—		
Operating costs, 1922, labor, repairs and miscellaneous exp.	1,557	
Inspector for automatic substations		2,400
Maintenance of substations, nine at $500		4,500
Maintenance of Cars—		
Maintenance costs, 1922, including electrical equipment and depreciation	76,260	
Maintenance of steel passenger cars with modern d.c. equipments, 1,010,000 (1922) car-miles, at 3.2 cents		32,320
Maintenance of other cars, wood bodies, d.c. operation, mostly modern motors, 404,000 (1922) car-miles, at 3.6 cents		14,544
Maintenance of Track—		
Maintenance costs 1922 [Passenger car-mileage is 71 per cent of total]	72,302	
Of the expenses due to passenger cars 70 per cent are unchanged by reduction in weight, amounting to		35,934
The remaining 30 per cent of the cost due to passenger car-mileage are reduced in proportion to the weight, amounting to		11,100
The remaining 29 per cent of the total track maintenance costs will be the same as in 1922, as they are on account of continued use of present equipment other than passenger		20,968
Dpereciation, 4 per cent on estimated investment of $785,323		31,413
Total	$332,730	$221,863
Net saving (14.1 per cent on estimated investment of $785,323)		110,867

the substitution of direct current, or 14.1 per cent on the estimated cost of $785,323.

Effect of Change on Operating Revenue

Entirely aside from the subject of cost of maintenance and operation, the proposed change as outlined herein should be productive of a marked increase in operating revenues, according to Mr. Richey. The present equipment is productive of many exasperating delays in the service, due to the unreliability of the single-phase motor and control equipment and the complications further involved by the necessity of operating such equipment over the direct-current lines in Indianapolis. In the past three years the times cars were pulled out of service due to electrical equipment failures have amounted to nearly 2,000, or an average of 664 per year. A study of the train dispatcher's reports for the first eighteen days of April shows 110 cases of delays to schedule sufficiently important to be included in the dispatcher's report, and including only those delays directly traceable to the single-phase equipment and which would not be expected with proper d.c. equipment.

When it is remembered that all of these delays are on a road which operates in regular service only fifteen passenger cars, it will be realized that an unwarranted irregularity in schedules must result. Such irregularity would be practically smoothed out by the substitution of modern direct-current equipment even if of the same capacity as that at present operated. The present cars weigh 51½ tons and carry a motor equipment of 400 nominal horsepower, which amounts to 7.8 hp. per ton of car. The proposed cars weigh but 36 tons and will carry a motor equipment of 420 nominal horsepower, amounting to 11.6 hp. per ton, or an increase of nearly 50 per cent over the present. This increase in relative motor capacity will still further eliminate delays, including those trips when trailers are handled. The change from an irregular and ragged operation to that of regular strict maintenance of schedules would without question produce a considerable increase in patronage.

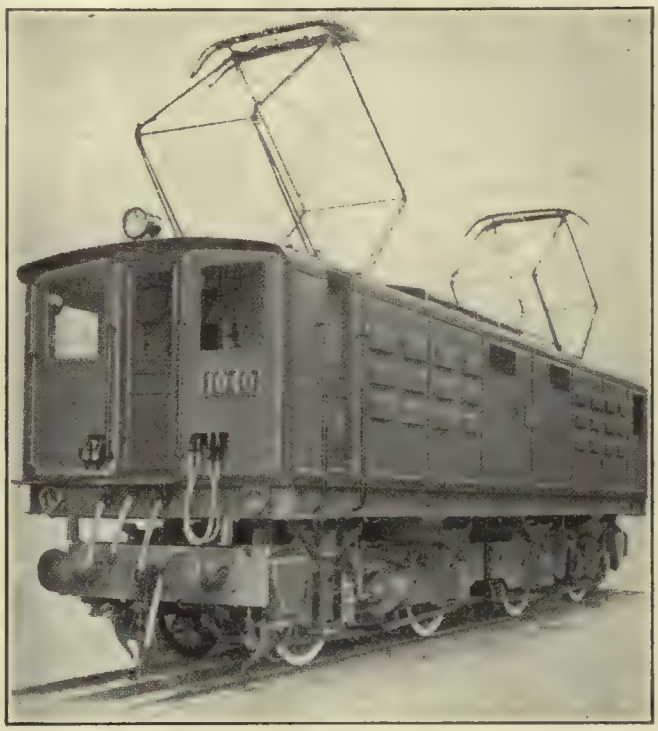
The cars contemplated in the proposed plan are of all steel construction, somewhat larger than the present cars, and will have very greatly improved riding qualities. In addition to the fact that these cars will have less maintenance and operating cost, there will be a considerable advertising value to the comfortable and attractive all steel cars. Further, it is the universal experience that the re-equipment of a road with new rolling stock brings a certain amount of new business.

Taking all of these matters into consideration, it is the opinion of the consultant that the re-equipment of the road as contemplated herein will increase the passenger revenue by an amount somewhere between 20 and 35 per cent of the 1922 revenues, or by an amount somewhere between $95,000 and $165,000. The result will depend largely on the amount of advertising publicity which is given to the change. With a consistent, aggressive advertising policy, started coincident with or a little before the new operation is begun, it will be possible to approximate the latter named increase of $165,000 annually. There is, of course, the possibility that with so large an increase in passenger business it may be necessary to operate a heavier schedule during some portions of the day, which would correspondingly increase operating expenses, and in this case the net result would not be as large as the figure quoted. However, it should be possible to increase the net revenue by some amount between $125,000 and $150,000 per year.

At the present time the total operating revenue of the light and power department is approximately $30,000. With three-phase power available it will be possible to furnish better power service than from the present single-phase lines. With these improvements in the light and power service, it should be possible to double the gross revenue of this department, especially through proper advertising and solicitation.

Japanese Electrification Progressing

THE Japanese government is going into the matter of electrifying the State Railways in a thorough and comprehensive way. In pursuance of its general plan, in 1921 the government ordered two 65-ton (130,000-lb.) freight locomotives from each of four firms. An illustrated account of the locomotives furnished by the General Electric Company was given in the issue of this paper for Dec. 23, 1922, page 975. In June, 1922, an order was placed with the English Electric Company for thirty-four locomotives, the number required for the 1923 program. (See ELECTRIC RAILWAY JOURNAL, July 15, 1922, page 140.) These locomotives are now being delivered.



Freight and Local Passenger Locomotive for Japanese Government Railways

The leading article in the *Tramway & Railway World*, London, for May 10 is devoted to an illustrated description of the later locomotives, with details of the shipping procedure. The freight and local passenger locomotives are of the 0-4-4-0 type, that is the body is supported on two 2-axle trucks without pony axles. The weight is evenly distributed on the four axles, being kept within the limit of weight per axle of 16½ tons (or 33,069 lb. to be exact) imposed by the government railways. The locomotive trucks are articulated, so that drawing and buffing stresses do not go through the superstructure. The locomotives are designed for the government standard of 1,500 volts, direct current, and each is equipped with four 306-hp. motors arranged in groups of two in permanent series.

Seventeen of the locomotives will be used entirely for freight service and nine others for hauling local passenger trains. These are all of the type described above with the exception that the gear ratio is adjusted on the freight locomotives to give a maximum speed of 40 m.p.h. and the others a maximum speed of 53 m.p.h.

The eight passenger locomotives are of the 4-6-6-4 type. The superstructure is mounted on two articulated trucks, each with a pony truck and three driving axles. This locomotive weighs practically 108 tons (215,000 lb. more exactly), the distribution of weight being nearly 13½ tons (27,000 lb.) on each driving axle and on each pony truck. Six motors of the same type as those used on the other locomotives are included in the electrical equipment.

Why the Unlimited Pass Was Withdrawn in Youngstown

The Youngstown Municipal Railway, First Sizable Company to Try This Plan, Was Blamed for Having a 9-Cent Fare When the Actual Revenue per Passenger Was Less than 7 Cents

ON APRIL 1, 1923, use of the unlimited weekly pass in Youngstown was discontinued after a trial lasting somewhat longer than a year. Although the scheme had been tried in several smaller places prior to its inauguration by the Youngstown Municipal Railway, the experiment of this company attracted special attention because of the greater size of the city.

The arrangement inaugurated at that time, with rates of 9 cents cash, six tickets for 50 cents and 1 cent for transfer prevailing, was a weekly pass giving the holder unlimited riding privileges for $1.25. Many jitneys were then operating in the city and one of the results expected from the pass was the gradual conversion of jitney riders into regular car riders. It was thought that people would buy the pass and use the railway to the exclusion of all other means of transportation. This object was, in fact, accomplished to a large extent, but in the long run the scheme failed to produce a revenue that would yield a fair return.

Since the inauguration of the pass the gross revenue of the company has increased materially, but there was an increase in the volume of general business in the district about the same time that the railway showed a gain, and it is impossible to say how much of the latter was due to the pass and how much was due to other causes. Two years ago the steel mills were operating at not over 25 per cent of their capacity, whereas they are now operating at about 90 per cent of their capacity.

On account of the great changes in industrial conditions in the Mahoning Valley during the past few years revenue figures are likely to be misleading. Although pass riders were recorded on the fare registers, there was no way to distinguish between original rides and transfer rides. Consideration has therefore been given more to the matter of average fare than to revenue or total passengers.

In general, those people who used the railway oftener than fifteen times a week availed themselves of the pass, and those who rode less frequently paid fare by cash or ticket. If all passengers had bought passes the profit on the occasional rider would have balanced the loss on the frequent rider, but as it was, the railway lost on the latter and failed to gain on the former. The actual return per revenue passenger became less than 7 cents and was steadily decreasing at the time the pass was withdrawn.

The transferable feature of the pass deprived the railway of many fares. In one case several barbers employed in the same shop arranged their lunch hours so that one pass sufficed to take them all home for the midday meal and bring them back to work again. Canvassers, telegram delivery boys and others engaged in similar occupations used the pass to secure a large number of rides at an extremely low rate. The proprietor of two moving picture theaters located some distance apart on the same street car line and each giving three performances a day bought a pass for the messenger boy so that he could carry the films from one theater to the other. The boy traveled forty times a day on week days and eighty times a day on Saturday and Sunday. By using a weekly pass his average fare came to a fraction of a cent.

Under the so-called 9-cent fare, the company was actually receiving less than 7 cents. Yet if a stranger inquired concerning the fare in Youngstown he was told that it was 9 cents. There was more or less popular clamor against what appeared to be a high fare, although it was not bringing the railway a fair revenue. The situation was, therefore, thought by the Street Railway Commissioner to be unsatisfactory. A service-at-cost plan is in effect in Youngstown and a conference of all interested parties was called. The commissioner held that the principle of unlimited rides for a small fixed sum was economically unsound, and advocated the abolition of the weekly pass and a reduction of the cash fare.

On April 1 a new rate was inaugurated for an eight weeks trial. Under this arrangement, the cash fare is 7 cents, tickets are sold three for 20 cents, and transfers 1 cent. It was thought that this plan would produce a greater average return per passenger while at the same time reducing the high cash fare. A decrease in riding was expected to follow this change, and preliminary reports indicate that the number of passengers has decreased more than 16 per cent. One reason given for this is the bad reaction of the change upon former users of the pass. That feeling, however, is likely to disappear in a short time.

New Rate Appears to Be Inadequate

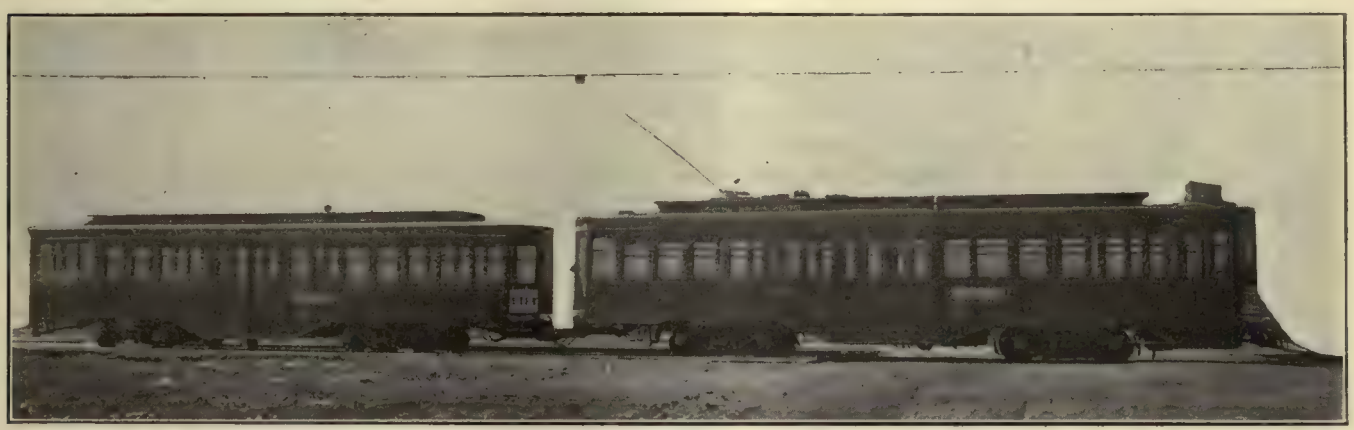
Figures compiled up to date indicate that the new fare may not be adequate, as told in the ELECTRIC RAILWAY JOURNAL for May 12. The revenue has decreased more than 15 per cent. Due to a greater use of tickets there are now actually fewer 7-cent cash passengers than there used to be 9-cent cash passengers. However, the increase in ticket sales is not enough to prove that pass holders of former times are spending just as much for carfare as before.

In spite of the falling off in revenue under the new rate, there were net receipts applicable for interest and dividends during the first month of $7,500. However, this was much less than in the preceding two months as the net revenue after all operating deductions had been made was approximately $22,300 in February, 1923, and $24,500 in March. If the present rate does not prove satisfactory at the end of the eight weeks trial an 8-cent cash rate with seven tickets for 50 cents will probably be the next step. It is hoped, however, that with the uncertainty of unlimited riding for a fixed sum eliminated, a satisfactory rate will soon be found.

Pittsburgh's New "Light Six" Train

A Standard Light-Weight Motor Car Has Been Arranged for Operation with a Motorized Trailer—Only Slight Modifications in Platform Controller Are Required, with a Three-Wire Train Line—Emergency Braking Is a Feature

A NEW type of two-car train, composed of low-floor cars, has been developed by the Pittsburgh Railways. The salient feature is the use of two motors on the second car, arranged for forward motion only and without a separate controller. This results in simplification of the wiring on both cars and allows the use of the standard K-43 type of controller on the forward car. Only a three-wire connection between the two cars is needed, and it is energized only when power is on the motors. The regular motor car, being of light weight, is better suited for all-day operation than would be a car carrying the entire motive power for the train.



Pittsburgh Railways' Low-Floor Motorized Trailer Train

For many years the company has been using two-car trains for handling the rush-hour service. Originally these were made up with standard double-truck motor cars hauling obsolete single-truck cars from which the motors were removed, and which were remodeled for use as trailers. In 1910 a type of light-weight center-door trailer, especially designed for this service, was developed by the company's engineers. This car was distinguished by its small diameter wheels, which permitted an extremely low floor. It was described in ELECTRIC RAILWAY JOURNAL for Dec. 10, 1910.

But one type of car is available in Pittsburgh with sufficient motor capacity to stand regular daily service hauling these trailers. This type, which was introduced a number of years ago, is a standard end-entrance double-truck car equipped with four 60-hp. motors. While cars of this type can make satisfactory schedules when hauling trailers, their weight and motor capacity are excessive, as judged by modern standards. Moreover, some of these cars have been in use for such a period of time that they are approaching the end of their useful life and may have to be replaced.

Another type of motor car which has become standard with the Pittsburgh Railways is the low-floor, center-door car. The design is quite similar to that of the low-floor trailer. In fact, the first car of this type, described in ELECTRIC RAILWAY JOURNAL for Aug. 3, 1912, was one of the trailers modified, a front-entrance door being added and electrical equipment installed. It is considerably better for all-day service than the so-called trailer-hauler described in the preceding paragraph, and its four 35-hp. motors have ample capacity so that it can handle rush-hour loads admirably as an independent unit where such operation is suitable. For many of the long-haul runs in the rush hours, however, train service is preferred.

The low-floor motor car is so light in weight that it was felt by the management that it would not have sufficient traction to haul a trailer, as the wheels might slip on the heavy grades encountered on many of the Pittsburgh lines. While motors of sufficient capacity to haul light trailers might have been designed for mounting on the small wheels, still there would be the waste of energy due to hauling the excess weight around all day. Furthermore, it was considered desirable to make some arrangement whereby the existing cars with the 35-hp. motors might be utilized for train operation.

The company now has a considerable number of the trailer-haulers in all-day operation on lines where rush-hour train service is used. Since the decision had been made by the management not to re-equip the low-floor cars so they could haul trailers the question arose as to whether or not the additional equipment needed for expansion of the service should be of the older and less desirable type, merely to be able to haul the trailers for a few hours night and morning.

Tests made in Pittsburgh and elsewhere show that the power demanded by two-car trains is only 50 per cent to 60 per cent in excess of that taken by a single motor car making the same schedule speed under like conditions. The extra motor capacity required, therefore, is only about half that needed for single-car operation. A study of the situation made it apparent that if a satisfactory method of getting this additional capacity could be developed a desirable combination would be effected. In the past numerous plans have been tried by the Pittsburgh Railways and other companies for



Three-Wire Cable Connector and Socket Which Has Cover that Short Circuits Motors When Closed

using a two-motor car for special service as the second car of a train in connection with a four-motor car running throughout the day. A complete individual control system for each car, with some form of multiple-unit operation, has always been employed in such an arrangement.

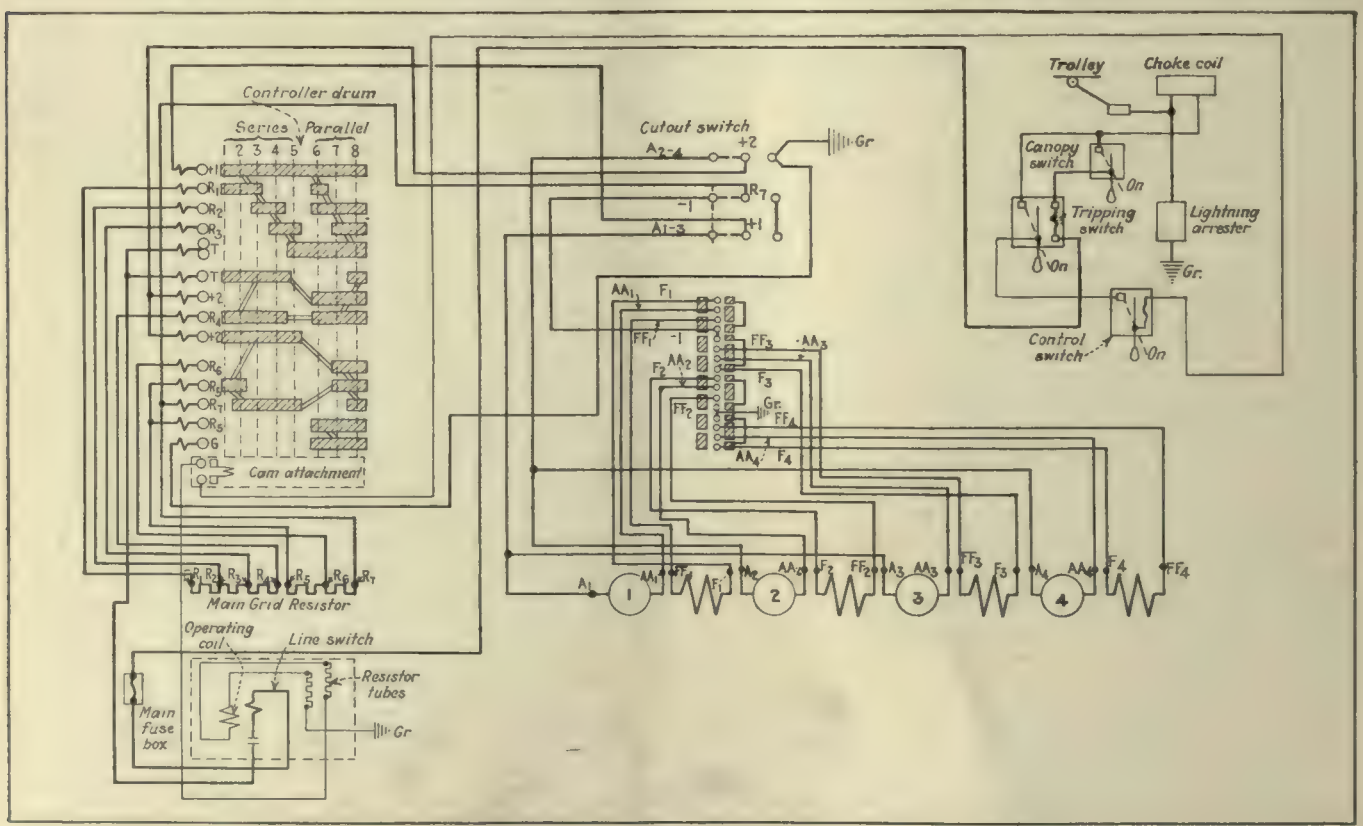
THE CONTROL SYSTEM

In designing the control and method of operation for the Pittsburgh Railways trains, for which P. N. Jones, general manager, and F. R. Phillips, superintendent of equipment, were responsible, it was decided that since the company was accustomed to handling dead trailers at the carhouses and had all facilities for doing so there would be no objection to continuing the practice. No attempt was made, therefore, to provide an independent control system for the second car of the train. While the trailer is motorized, it must be handled in exactly the same manner as a dead trailer. This, however, is not considered by the management a disadvantage sufficient to nullify the value of the plan, especially since considerable expense and complication are obviated.

The motor car of the test train is one of the company's latest low-floor cars. A description of this general type of car was given in ELECTRIC RAILWAY JOURNAL for July 3, 1915, although some minor improvements have been made in more recent orders. This car is equipped with four 35-hp. motors with K-43 control. The standard wiring for this control is shown in the first of the two diagrams.

In making the layout for train operation it was considered essential to retain the motor and control equipment intact, on account of standardization and first cost. For use with the two-car train the only modification is the addition of three contacts on the reverser drum, and the individual motor cutout switches, as shown in the second diagram. Three leads only connect the two cars. The two motors on the second car are mounted on its forward truck, and the field and armature of each are permanently connected in series for the forward direction of motion. If it is necessary to back the train, the motors on this car are simply cut out of circuit by throwing the reverser to the reverse position and the train is operated by the four motors on the leading car. Since few backward moves are made, and they necessarily must be at low speed, this is no disadvantage. It is this plan that may be considered the radical innovation, and on which the simplicity of the wiring depends.

As will be seen from the diagram, the motors of the leading car are grouped in pairs connected permanently in parallel in the standard arrangement, each pair being operated as a unit in the control. The two motors of the second car are added in parallel, one to each of the other pairs. The resistance of the grids is such that satisfactory starting will be obtained either for the motor car alone or when coupled with the motorized trailer. It has been found that, using the same grids, the variation in rate of acceleration between the operation of the four-motor car by itself and when it is coupled with the two-motor trailer is so slight that it is not noticeable. With the six motors in circuit the resistance is somewhat less in proportion to the current



Standard Wiring Diagram for K-43 Control of Pittsburgh Low-Floor Motor Cars

demand, so that the train accelerates at about the same rate as the single motor car.

Individual Motors May Be Cut Out of Circuit

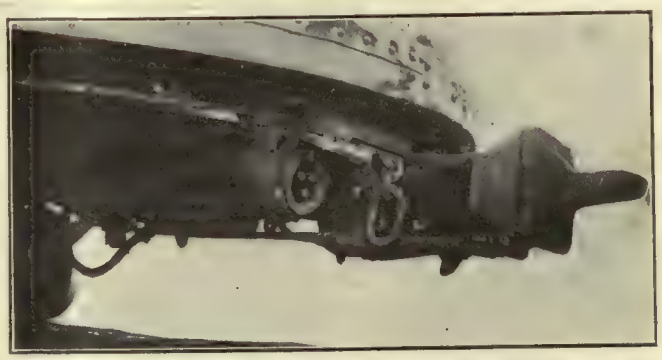
In case trouble develops in one of the motors of a standard four-motor equipment, both that machine and its mate usually are cut out of circuit by means of the switches in the controller, and the remainder of the run finished with the other two motors.

A special feature of this control is the arrangement of the connection board in the base of the controller so that a motor can be cut out independently. If any one motor of the six fails it is taken out of the circuit and the remaining five used. While there is some unbalancing of current in the series positions, due to having two motors in series with three, it is not enough to cause any trouble. In fact, it is not so hard on the machines as when two motors of a standard four-motor equipment are cut out of the circuit and the remaining pair have to haul the car. In case any two motors are disabled simultaneously, one being in each group, the remaining four motors can be used. They will be balanced in both the series and the parallel positions, and the car will operate at slightly reduced speed and with heating somewhat greater than is normally the case.

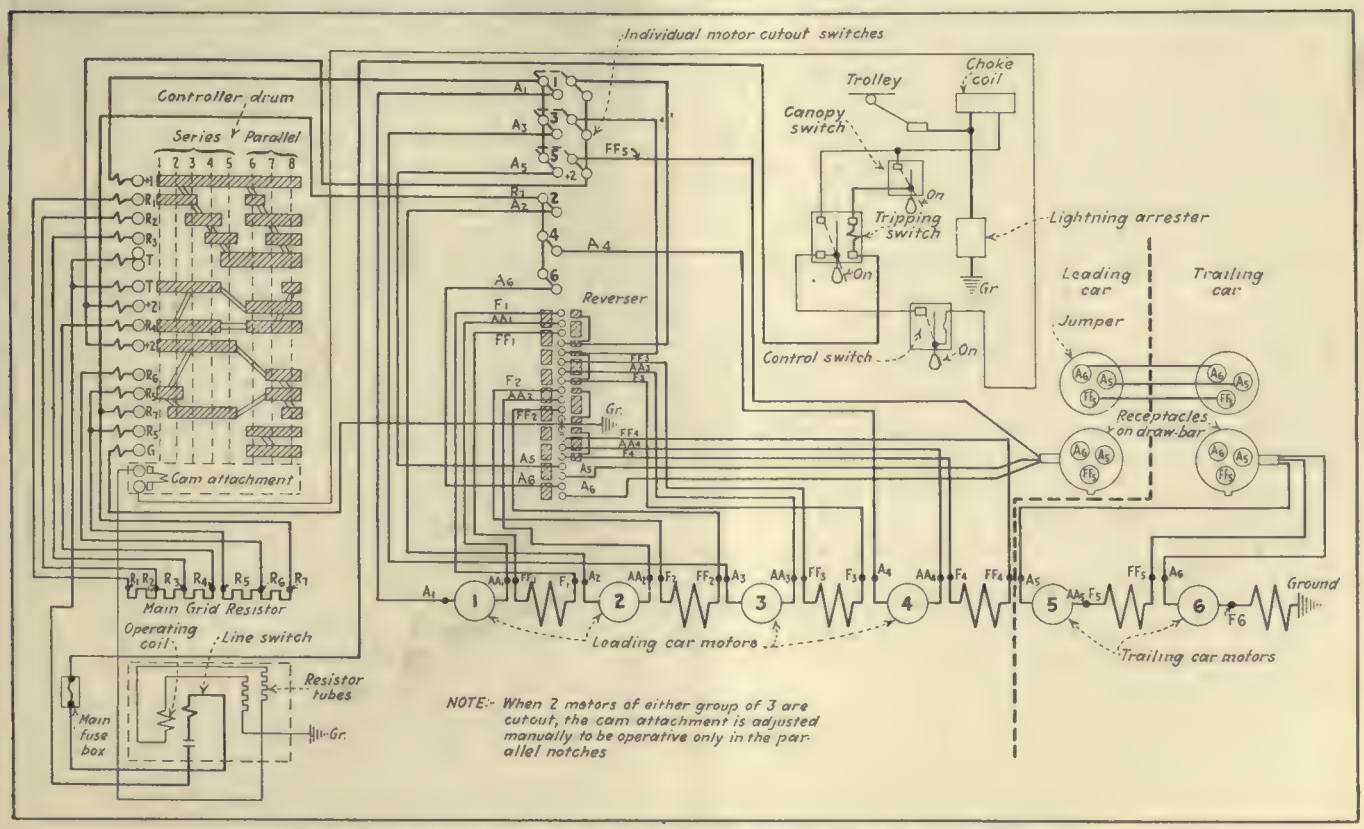
An interlock is provided by extending the cam located at the base of the main drum of the controller and used to operate the line switch. In the rare event that two motors in the same group are disabled at the same time and have to be cut out, this cam prevents the current flowing through the motors until the drum is turned to the first parallel position. In other words the control is changed from series parallel to plain rheostatic. Thus every contingency is provided for short of disability of all the motors, or of so many of them that it would be unsafe to move the cars with the remainder.

The connection between the two cars consists of a three-point receptacle on each car, with a three-line jumper connecting them. One novel feature is the provision for emergency braking. In the lid of the receptacle on the trailer car are three contacts, which appear white in the illustration. These contacts are connected together and are grounded. In case the train pulls apart the jumper will be pulled out of the receptacle on the trailer. The lid of the receptacle will then be forced down by means of a spring, and the contacts will provide a short circuit on each of the motors. Since the connection of these motors is permanently made for forward motor action it will be correct for backward generator action. In this way a powerful dynamic braking effect will be obtained. Then if the train should break in two while going up grade, the second car would begin to run backward, but would be retarded immediately by the dynamic braking, so that it would quickly be reduced to a low speed.

In tests made it was found that the train could be broken apart going up a 6 per cent grade, and the second car would at once slow down to a lower speed than a walk. A motor car following up the grade would then be able to approach the one that had broken loose and



The Socket for Making Connection Between Cars Is Mounted on the Coupler



Modified Wiring Diagram for K-43 Control for Use with Six-Motor Train

stop it without danger. In the event a break occurred on a down grade the second car would, of course, be in contact with its leader, and the dynamic braking would be unnecessary. Of course, the car is provided with air and hand brakes, so that the above is a very remote possibility. In any ordinary case the conductor of the second car would be able to set the hand brakes when the car was retarded to a low speed by means of dynamic braking.

Energy Saving Is Shown by Tests

The test train now is operating daily on a regular Franks:own Avenue run. The motor car is scheduled to make about 150 miles per day, while the trailer is in use for two round trips or 33 miles. On this particular run the arrangement saves 925 ton-miles a day out of a total of 4,012 ton-miles that would be run if the ordinary type of 240-hp. trailer-hauling motor car were used. Additional power is saved because the motors are better suited to the size of the car. The train is better able to make its schedule in the rush hours when power is needed, while the equipment of the standard low-floor motor car is ample for the non-rush. In the preliminary tests already made the energy saving was about one-fourth of the total that would be required for the standard trailer-hauler running all day, with a trailer added for the two rush-hour trips.

One advantage observed in making a trip on the car is the absence of the jerks, due to taking up the coupler slack at starting, that are common in ordinary trailer operation. The second car starts along with the first, and while there is a slight lag of the trailer during acceleration, due to the leading car supplying more than one-half of the accelerating force, this is scarcely noticeable even to a trained observer. Tests have shown that the drawbar moves out of its normal position only about ½ in. at any time during the acceleration. This results in smoother operation, and gives greater comfort than is had with the usual motor and trailer operation.

The low-floor car loads and unloads much more quickly than the older end-door car, with its narrow passages and high steps. In service this train is making its schedule better than other trains on the same route. This is due to two reasons, its ability to load and unload quickly and the quick starting obtained.

Electric Steam Boiler on North-Eastern Railway

THE North-Eastern Railway, Great Britain, is using on its electrified sections an electrically heated steam boiler, designed by C. O. Bastian in consultation with Messrs. Merz and McLellan. *Electrical Industries*, London, gives details as follows: The boiler is of the fire-tube type, each of the 144 tubes being fitted with a Quartzalite heating element. The boiler is 3 ft. 4 in. in diameter and 3 ft. 4 in. long and is capable of supplying enough steam for the longest train handled by the railway in ordinary service. The full loading is 408 kw. and at three-quarters load, with an input of 298 kw.-hr., 970 lb. of water was evaporated at 120 lb. pressure in twenty-four minutes.

The Quartzalite element for this boiler consists of a quartz tube ¾ in. in diameter, inside of which is a close spiral heating element of Tabasco resistance wire. The tube butts onto a mica washer, in the end of a hollow porcelain terminal, which is held by spring pressure to the terminal plate of the boiler. The end of the element is silver-soldered to the terminal, which traverses the porcelain.

This heating boiler operates on 1,500 volts, direct current.

Supporting an Extensive Overhead Network

Substantial "Back-Boned" Construction with Catenary Messenger Supports Has Minimized Maintenance Work on Forty-one Branch-Offs at Butler Street Carhouse in Atlanta

ON ACCOUNT of the large number of tracks branching off from the single track on Butler Street, Atlanta, Ga., into the Butler Street carhouse and adjoining yards, unusual precautions were necessary to safeguard the overhead construction against failure. Until recently there were thirty-one tracks branching



Overhead Connecting Curve Construction at Butler Street Carhouse in Atlanta

off at this point, and the overhead construction involved was briefly described in an article in the issue of the ELECTRIC RAILWAY JOURNAL for March 20, 1920, page 563. Since that time ten tracks have been added, making the present total of forty-one.

The main trolley wire over the original installation was of No. 000 copper, the thirty-one branch wires being of No. 000 galvanized iron. In the new installation, however, both main trolley and branch-offs are of No. 000 copper.

On account of the considerable weight of this overhead construction, with the consequent tendency toward sagging over the switches and curves, two ½-in. steel messenger wires were strung along the entire frontage of the carhouse and yard. One messenger is directly over the switches and the other is just beyond the point where the tracks straighten to enter the carhouse. The trolley network is supported to a large extent from these messenger wires by the usual catenary construction. This is shown clearly in the illustration on this page.

The manner in which the network is supported is shown in the accompanying illustrations. The overhead

work is of the type known as "back-boning," the trolley wire on each curve being paralleled by galvanized strand, ⅜ in. in diameter.

All span wires and pull-offs in this installation are made of ⅜-in. galvanized guy strands and are attached to the trolley wire at intervals of 7 ft. The attachments to the wire are made by means of double curve pull-overs. To provide insulation, a 9-in. wood strain insulator is linked into the eye of the pull-over on the outside of the curve. A ⅜-in. guy strand (the back-boning mentioned above) is run through the insulator eye at the end away from the trolley wire, and the span wires and pull-offs are also attached to the insulator eye at this point.

A 9-in. wood strain insulator is also inserted in the eye on the side of the pull-over toward the inside of the curve, and a short span wire is run from the other end of this insulator to another insulator attached to the trolley wire on the next track. The wire over the second track is installed just like the one described.



Catenary Messenger Supports and "Back-bone" Reinforcement Insure Durability in the Overhead Network

This "back-boning" serves to keep the trolley wire off the rails in case of a break and, by allowing continuous operation in spite of a break, it prevents interruption to service. All repairs on such construction can be made by trouble crews and a considerable saving is effected in this way.

The poles on the outside of the curve, which support most of the strain, are 8 in.-10 in. standard steel tubular poles set 7 ft. in concrete. They are set approximately 30 ft. apart. The poles located on each side of the outdoor track are A-grade creosoted pine, set 100 ft. apart.

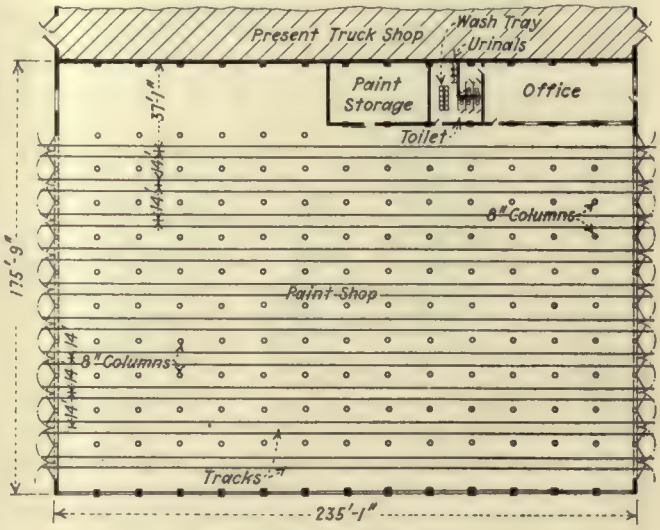
The weight of the construction over the entire ten new tracks was found to be too heavy to be supported by two lines of poles and a third line was set between the fifth and sixth tracks at intervals of 100 ft. The poles in this line are 6 in.-8 in. standard steel tubular poles. The poles at the end of the track are of creosoted pine and one pole is set for each two tracks, the wires being held in place by V-guy construction.

The cost of the new work on this installation, that is, over the ten new tracks, was about $2,420, while the whole installation over the forty-one tracks cost approximately $9,000.

$125,000 Paint Shop for Detroit

A Feature in the Construction of This Paint Shop Is the Method of Supporting the Scaffolds—The Painting Methods Also Are Described

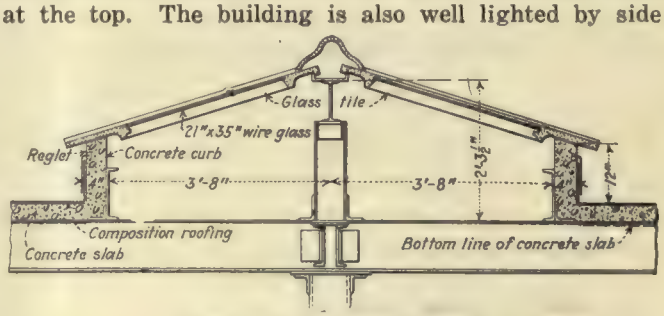
THE Detroit municipal railway is just completing the construction of a paint shop capable of accommodating fifty double-truck cars. It is being erected at Highland Park, close to the present repair shop of the system. When the property of the Detroit United



Plan of New Paint Shop

Railway was taken over by the city on May 15, 1922, the D.U.R. turned over its repair shops at Highland Park but kept its paint shop, which had recently been built. This building has since been converted by the company to office and repair shop purposes. This made a new paint shop for the municipal system immediately imperative. The one now being erected will cost about $125,000, and as it possesses a number of novel features, an account will be presented.

The building measures 175 ft. 9 in. x 235 ft. 1 in. outside dimensions, and is of steel and brick construction with concrete floor and composition roof and with monitors extending over each track. The end doors are of wood, metal lined on the inside, and steel sash at the top. The building is also well lighted by side

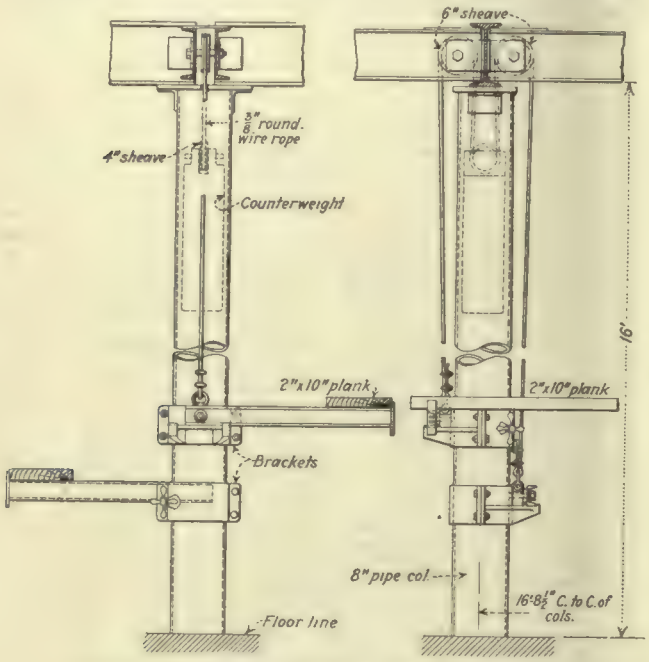


Section Through Monitor Roof

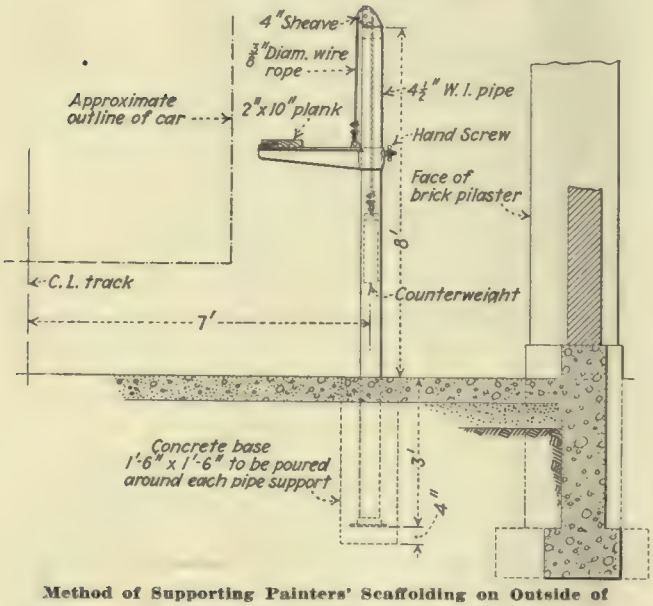
windows. It also contains a fireproof paint storage and mixing room.

Perhaps the most interesting feature of the building from a street railway standpoint is the method of mounting the brackets which support the scaffolding for painters. The support for the roof girders between each two tracks is a row of thirteen 8-in. wrought-iron columns, and these columns are used to support the scaffolding brackets. Inside of each column is a counterweight for balancing the weight of the

scaffold, as shown in the drawing below. A ⅜-in. wire rope is carried first around a 4-in. sheave on the counterweight and then over two 6-in. sheaves at the top of the column. The ends are attached to the brackets, which can be set in position by a handscrew. When not in use these brackets can be swung parallel to the tracks and thus be out of the way. For the bracket



Method of Supporting Painters' Scaffolding on 8-In. Supporting Columns



Method of Supporting Painters' Scaffolding on Outside of Tracks Near Wall of Building

supports nearest to the walls of the building, where there are no columns, a somewhat different arrangement is followed. The lower drawing shows this method.

Painting Methods

It is the plan of the municipal railway to use the enamel method in painting its cars, applied by spray guns. The equipment department has been using the DeVilbis spray gun, manufactured in Toledo, and will have an equipment of ten of these guns when operation begins in the new shop. It has been found that one man with this gun will do the work of three with the brush, and the brush method is used only for painting the wooden sash. The headlining of the car will be painted two coats of white enamel and all other parts one coat. London gray enamel has been adopted for the inside finish of old cars, and canary yellow for the exterior body color. The cleaning of the trucks for painting is accomplished by the use of a water jet sprayed at high velocity by means of air at 100-lb. pressure. The under side of the cars will also be painted, the paint being applied by the gun method. It is expected that cars will require only four or five days in the shops for painting.

Car Washing

While not directly connected with car painting, car washing is closely related to the preservation of the surface finish of cars, and the practice of the Detroit Municipal Railway will therefore be described. The standard practice in car cleaning, with some time studies of the approximate time required, is outlined as follows:

Car Cleaning Program

Daily Cleaning—Sweep car body, vestibule and steps. Sprinkle slightly. Brush out corners and around pipes with hand brush, and sweep refuse into basket. Spray with disinfectant. Time for double-truck car, twenty-five minutes; time for single-truck car, eighteen minutes.

Car Washing—Cars to be washed every three days, using plain water only. Exteriors to be thoroughly wet below the roof line, then scrubbed with bristle brushes, rinsed and allowed to dry. Double-truck car, sixteen minutes; single-truck car, eleven minutes. Interiors: Windows only to be washed with clear water and sponge and wiped dry with rubber window cleaner. Double-truck car, forty-two minutes; single-truck car, thirty minutes.

Monthly Cleaning—Bodies to be scrubbed with prepared car cleaner and washed. Interiors: Windows to be washed as above. Deck windows to be washed. Moldings to be wiped with oiled dustcloth. Lamps and shades to be cleaned. Curtains to be dry wiped. Side walls, vestibule walls to be washed with sponge where necessary.

Yearly Cleaning—All interior woodwork to be washed with prepared cleaning solution, rinsed with clear water and dried.

General—In bad weather, especial care must be given to windows. Keep them clean at the sacrifice of the bodies. During stormy weather, when outdoor work is impossible, devote all time of the outdoor crew to interior cleaning. Monthly cleaning to be carried on continuously; that is, do not bunch the work at the end of the month, but do a share of it daily, keeping careful record of date of monthly cleaning so that not more than a month elapses between cleanings. Car-cleaners will be required to report to carhouse foremen of any car defects noted.

For the washing every third day of the exterior, as mentioned in the program just given, the car is run through a spray shower in the carhouse, as described on page 705 of the issue of this paper Oct. 28, 1922. The car body is then scrubbed with brushes and rinsed by running through the spray shower again.

Liverpool to Abolish Two Classes on Tramways

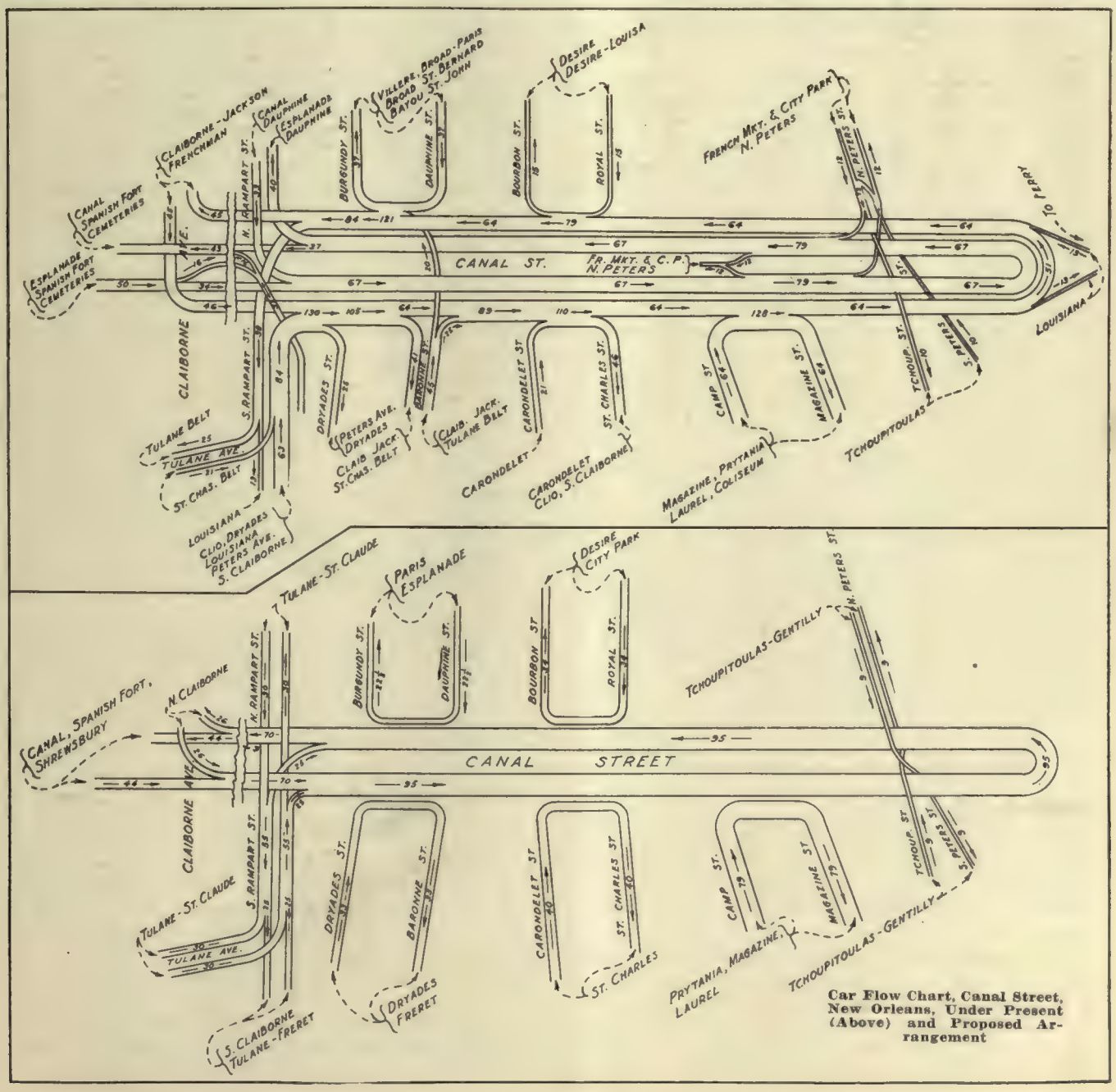
THE Corporation of Liverpool has decided to return to the one-class tramway system. Fifteen years ago the experiment with first and second class tramcars was begun, but as the system proved unsatisfactory, a double-deck method was inaugurated—first-class passengers on the lower and ordinary fare passengers on the upper deck. Partly owing to the fact that no passengers were allowed to stand in the double-deck cars, that arrangement also has proved unsatisfactory and unprofitable. Hence the proposal to return to one-class cars.

Canal Street Rearrangement, New Orleans

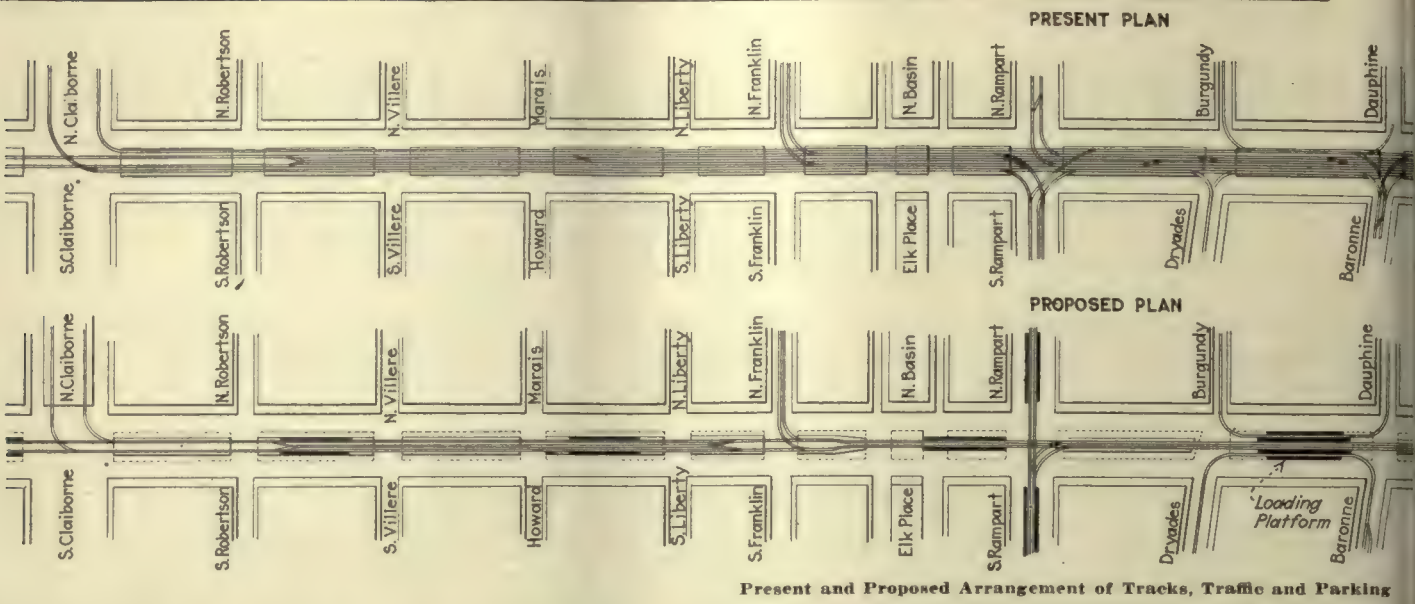
Car Speed Increased in Downtown Section—Amount of Track on Canal Street Reduced 50 per Cent and Special Trackwork 75 per Cent—Traffic Congestion Decreased and Street Capacity Doubled—Greater Safety for Patrons and Improved Parking Facilities for Automobiles

SECTION III of the report for the city on the local transportation system in New Orleans by John A. Beeler deals with the track facilities and traffic conditions on Canal Street, the principal thoroughfare of the Mississippi River seaport. This great thoroughfare of magnificent proportions, the report states, is the dividing line between the up and down town sections. It is as unique in its characteristics as it is important in its location. With a width of 170 ft. between property lines, it provides separate roadways for traffic in both directions, while its broad, commodious, neutral ground should afford more than ample facilities for street car tracks. Its width and plan provide an excellent opportunity for developing the easy flow of a great volume of both vehicular and street car traffic.

From the Canal Street loop to Claiborne Avenue, a distance of less than 1 mile, there are, including connections at intersecting streets, 6.91 miles of track, or the equivalent of seven tracks for the entire distance. The two gages, requiring a third rail, and the conglomeration of costly special work are an inheritance from the days of competitive lines. Every line in the city but one is now routed to cover some portion of this section of Canal Street. Despite the multiplicity



Car Flow Chart, Canal Street, New Orleans, Under Present (Above) and Proposed Arrangement



Present and Proposed Arrangement of Tracks, Traffic and Parking

of tracks, the car movements are so delayed and hampered that a speed of but little better than 6 m.p.h. is maintained through the day. During the rush hours this speed drops to 4.75 m.p.h.

During the morning and evening rush periods, it is no unusual thing to see twelve or more cars within the limits of one block. About one-quarter of these will be loading, while the rest are waiting. The slow loading; interference by turning movements of cars, especially the left-hand turns; the use of non-clearance curves; the counter-traffic movement of vehicles, and the frequency of stops, paralyze service in spite of all facilities at hand. The large number of motor cars and trucks in use, together with the demand for parking space, have so congested the roadways that general traffic fairly trickles through. Conservatively stated, the engineer points out, the utilization of roadway space for all moving traffic is now at a minimum.

An accompanying drawing shows the present and proposed track layout on Canal Street. From this it will be seen that the through tracks are reduced in general from five to two, and that the lines looping back at Canal Street are operated over separate tracks, so as not to interfere with the through movement of cars on Canal Street. This reduction in the number of tracks releases a large amount of the area of the neutral ground for parking purposes and loading platforms. The general plan so increases the capacity of the street that in the blocks where four tracks remain and with four recommended loading platforms in place there will be room for three lines of moving traffic all of the way through on either side of the tracks, and with room for standing vehicles alongside the curbs, as compared to but one line on one side and two on the other as at present. The present arrangement permits parking of cars in any block at right angles to the length of the street, thus materially reducing the space available for through traffic, whereas in the proposed arrangement, parking of cars would be permitted only in the blocks between loading platforms, where their presence would not diminish the space available for moving traffic.

The simplification of the movement of cars is most easily visualized by reference to the car flow charts, as at present and under the proposed plan, reproduced herewith. Figures behind the arrows indicate the maximum cars per hour. In comparison with the present system the proposed plan of operation reduces the number of left-hand turns from 119 to 25, the number of right-hand turns from 314 to 25, the number of left-hand car interferences from 471 to 75, and the number of right-hand car interferences from 374 to 25. This makes a reduction in both directions between Wells and Rampart Streets of from 433 to 50 turning movements, and from 845 to 100 interferences.

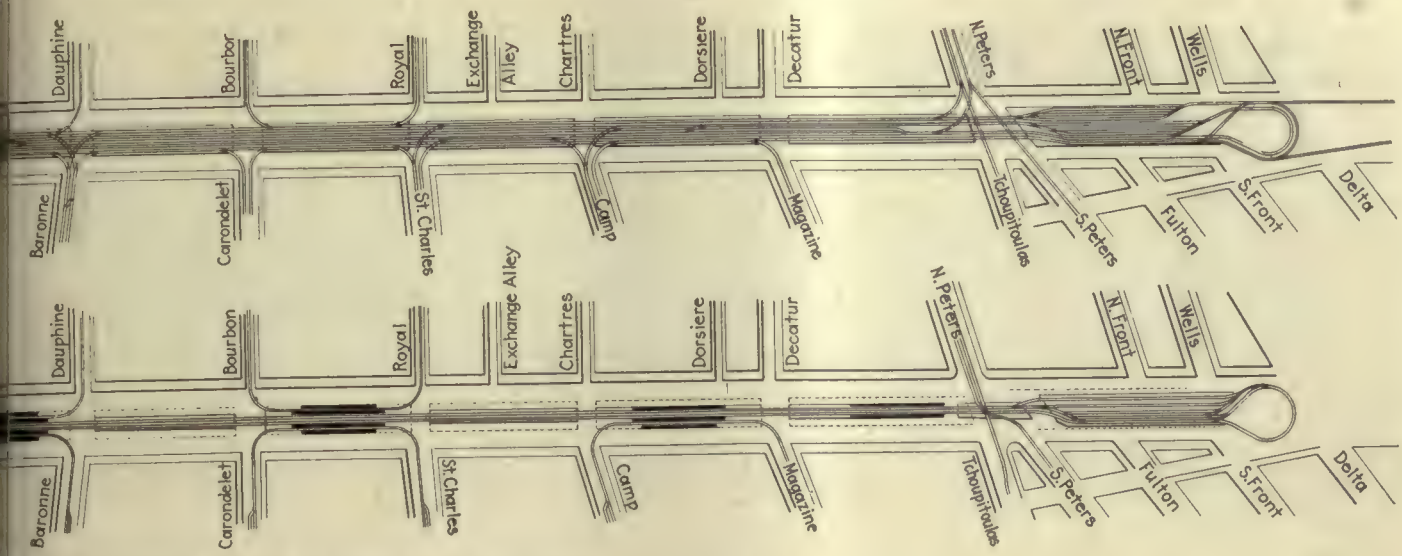
The report states that the movement of main-line cars will not be hampered by the intersecting lines which terminate at Canal Street, from either the up or down town section. Neither will the latter lines be interfered with or delayed by the traffic of the through Canal Street cars, as they will be completely segregated from each other. In place of the present tangle of special work and overhead wires, there is substituted a clean-cut system of independent main-line tracks and simple non-interfering curves without switches, crossings or turnouts.

The effective roadway space would be virtually doubled. This would permit at all times three moving lines of vehicles, with ample space for standing trucks or automobiles next to the curb. The area of roadways between Wells and Rampart would be increased from 206,741 sq.ft. to 280,281 sq.ft., and between Rampart and Claiborne from 133,450 sq.ft. to 195,520 sq.ft. This is an increase of 73,540 sq.ft., or 35 per cent, in the roadway between Rampart and Wells alone, where every foot should be used to its maximum capacity. It will also make available 62,070 more sq.ft. above Rampart Street.

In the blocks where the uptown and downtown lines terminate, stops would be made at loading platforms, permitting easy transfer from one line to another. These stops are located in alternate blocks. In the other blocks the present outside tracks would be removed and the space there reserved for parking, thus creating a protected parking space.

In regard to the loading platforms recommended, the report states that on Canal Street they should be not less than 200 ft. long, 6 ft. wide and 10 in. above the top of the rail. To secure full advantage of the plan, double berthing of street cars must be practiced at all times. The use of street collectors during periods of heavy loading is also recommended.

The consultant finds that the tracks and special work on Canal Street are now in such a bad state of repair that the greater part of them will have to be rebuilt during the next few years. It would seem, therefore, that now is the opportune time to make the proposed



Areas and Loading Platforms on Canal Street, New Orleans

changes. If tracks and special work are renewed as they now exist, perpetuation of the present deplorable condition will continue, with the accompanying costly maintenance and cumbersome operation.

On the other hand, the installation of the proposed plan would do away with the necessity of the renewals or replacements now contemplated by the company. The track under the proposed plan could be constructed at a considerable saving over the cost of the necessary renewals, and would materially and permanently reduce operating and maintenance costs. The advantages of the new plan as to track may be seen in the brief comparison in the table in the next column.

This represents a reduction of 51 per cent of track-miles and 75 per cent in the special track and overhead work. The most important reductions are in the items whose maintenance and renewals are greatest, that is, curved track and special work.

	Present	Proposed
Track in miles	6.91	3.40
Curved track in miles	0.94	0.22
Track crossings, number	60	11
Switches, complete, including mates and frogs	60	25

This simplification on Canal Street would result in both immediate and lasting financial benefits. To renew the property along its present lines would cost approximately $410,000. The new plan can be installed for $304,000, which will be an immediate saving of $106,000. The estimated annual maintenance and renewal cost of the present plan is $62,000 as against $27,000 under the proposed plan, or an annual saving of $35,000.

Bonus Given in Racine for Saving Energy

THE Milwaukee Electric Railway & Light Company encourages the motormen on the Racine division to save energy in car operation by paying a bonus depending upon the saving made. In Racine all of the cars are of one type, namely, Birney one-man cars, except for a few rebuilt safety cars and the trains used during the rush hours. There are two types of trains, namely, a two-car train, consisting of a motor car and a trailer, and the articulated two-car three-truck train, like those used in Milwaukee. Tests have been made with each of these cars and trains to determine the power used, and to simplify the keeping of records all Economy meter records are reduced to the Birney standard.

The present plan was put in operation after it had been determined that the average energy consumption of the Birney cars under Racine conditions at the time the plan was begun was 1.3 kw.-hr. per car-mile, and the company offered to divide the gain made below this figure in the proportions of 40 per cent to the men, 40 per cent to the company and 20 per cent for the expenses necessary to keep the records of the system. Originally, this saving was divided equally among the men, but later (March 1, 1922) the plan was begun of rewarding the more efficient motormen by dividing the bonus in proportion to the efficiency shown.

To do this, it is obviously necessary that the operating conditions, so far as energy consumption is concerned, should be the same for the men compared, and it is quite possible, of course, on any system that one line may be more hilly or construction work may be going on, or for some other reason some runs require more power than others. Hence, instead of taking the standard of 1.3 kw.-hr. for each line, the average energy consumption per car-mile for each line is taken as the standard and each man is graded as to whether he does better or not so well as the average. The bonus for the entire system, based on the 1.3 kw.-hr. figure, is then divided up among the different lines according to the car mileage on each line, and the bonus for each line is divided up among the men according to their performance. For instance, in Racine during March, 1923, the total bonus earned from energy saving by the seventy-six men employed was $118.23, the average power consumption being 1.12 kw.-hr. per car-mile, on the Birney car basis. The highest man on the list, instead of getting an average of $1.56, received $3.20. His operating average was 0.94 kw.-hr. and he operated during the month 1,543 miles. The motorman using the greatest amount of power used 1.43 kw.-hr. He was penalized 26 cents and was the only man on the list who was penalized.

The way in which an individual bonus would be calculated is as follows:

Assume

a = Average energy consumption of any particular line

b = Average energy consumption of the individual

M = Total car-miles operated on the line

m = Car-miles operated by the individual
V = Total value of the energy saved
$0.4V$ = The trainmen's share of saving made,

then any individual bonus equals a proportional share of the total bonus from energy saving based on car-miles operated, or $\left(\frac{0.4V}{M} \times m\right)$, plus the increment earned due to individual efficiency relative to the line average or $(a - b) \times m \times 0.4V$.

In other words, the individual's bonus is $\frac{0.4V\,m}{M} + (a - b)m\,0.4V$, which is equivalent to

$$m\left(\frac{0.4V}{M} + 0.4V\,(a - b)\right)$$

Of course when b is greater than a, the expression $0.4V\ (a - b)$ becomes minus, but only in exceptional circumstances would b be so large as to make the whole expression a minus quantity. It will also be observed that as every operator is interested in increasing the value of V there is an incentive for the efficient men to teach the inefficient men to operate more efficiently.

The following is a list of the amounts in round figures since January, 1921, of the savings or loss in energy measured in dollars divided among the men on the Racine system according to the plan described:

January, 1921	Loss $29	March, 1922	Gain $86
February, 1921	Loss 22	April, 1922	Gain 91
March, 1921	Loss 23	May, 1922	Gain 134
April, 1921	Gain 17	June, 1922	Gain 156
May, 1921	Gain 22	July, 1922	Gain 113
June, 1921	Gain 77	August, 1922	Gain 183
July, 1921	Gain 91	September, 1922	Gain 169
August, 1921	Gain 75	October, 1922	Gain 180
September, 1921	Gain 72	November, 1922	Gain 128
October, 1921	Gain 61	December, 1922	Gain 68
November, 1921	Gain 23	January, 1923	Gain 78
December, 1921	Gain 00	February, 1923	Gain 73
January, 1922	Gain 22	March, 1923	Gain 118
February, 1922	Gain 44		

It will be noted that the savings are greater in the summer than in the winter months. This is only natural when an annual standard is set, but as any inequalities even themselves out during a year and an annual standard is simpler, the company holds to that plan.

A bonus along the lines mentioned is being considered for the Milwaukee system of the company, but no definite plan has been decided upon. The combined property has 750 cars equipped with Economy meters, having installed the first 350 meters in 1917.

Carrying Safety to the Public—IV*

Visualizing the Safety Idea by Means of a Poster Campaign—Slogans of Interest Get the Attention of the Public by Widespread Display—Car Cards Also Can Be Used to Advantage

By C. W. Price
Vice-President in Charge of Public Safety, Elliott Service Company, New York City

IN THE development of public safety the question which has claimed attention more and more is how to visualize safety, how to keep safety continuously and impressively before the public. The Washington Safety Council's solution of this problem is by the conduct, on an extensive scale, of a continuous poster campaign. The splendid record recently made of reducing accidental deaths 32 per cent is due, so its officers think, in a large measure to the poster campaign.

Each month a new poster is issued bearing a snappy slogan. For instance, the first poster read, "The Reckless Driver Is a Criminal"; the second, "The Jaywalker Is Taking a Short Cut to the Hospital," and the third poster read, "Better Be Careful Than Crippled." These posters are done in different colored inks and paper each month, and are made in three sizes—25 in. x 38 in., 16 in. x 24 in. and 8 in. x 18 in. The largest sized posters are exhibited on 100 permanent metal signboards on stanchions located at important street intersections, at gasoline filling stations, and at entrances to industrial plants. They also are posted on vacant billboards. The second sized posters are exhibited on the dashboards of all street cars, and in government and municipal buildings, including school houses. The smallest sized posters are carried on taxicabs, buses and other commercial vehicles.

The display of posters on street cars, taxicabs, buses, trucks and other commercial vehicles, which are constantly moving up and down the streets, gives an enormous distribution of the poster display, considering the number used. The posters bearing a slogan printed from type in large, bold letters are much less expensive than those done with elaborately colored cartoons, and are found to be more effective. What is needed is a poster that instantly catches the eye and can be read easily at a distance.

A snappy, gripping slogan is much more effective than either a positive or a negative statement. For instance the slogan "The Jaywalker Is Taking a Short Cut to the Hospital" will be noticed and remembered, when "Cross at the Crossing" or "Don't Jay Walk" will scarcely get a passing glance.

The posters issued thus far have received attention on both the editorial and news pages of the press. In the correspondence columns have appeared numbers of letters, some praising, and some in tart language condemning the posters, all of which is evidence that the slogans did get the attention of the public.

Widely distributed as these posters are over the city, it is not possible for a driver or pedestrian to come down into the heart of the city without being reminded a dozen times of the idea of safety; and he is reminded at the very points where the hazards are greatest. The automobile driver may read articles on safety while he sips his breakfast coffee, and by the time he backs his machine out of the garage, he has forgotten. But if on his way down town he is confronted at every dangerous street intersection with the accusing indictment, "The Reckless Driver Is a Criminal," he is compelled to remember safety. During the progress of the campaign a prominent business man said to a friend, "I am a reckless driver; I'll admit it. But those posters on the

*The fourth of a series of ten articles.



Copyright Underwood & Underwood, New York

The Month's Slogan Was Displayed on 100 Sidewalk Signs, and on Cars and Vehicles

street have got me. Every time I face one going down town I slow up."

Complete material for a poster campaign, including the posters and instructions regarding their application, are now available and on the market.

Defining the cross walks at street intersections with broad white lines is a method of visualizing safety which has been used in many cities with good results. These lines, if kept freshly painted, not only serve to visualize safety, but they help to direct the pedestrians in the "straight and narrow way."

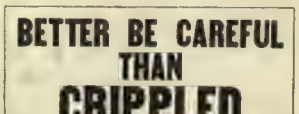
In order to give variety and a bit of color to the crossings, an arrow or a hand, with the finger pointing to the space between the white lines, should be stenciled on the sidewalk—preferably in a color other than white, the color being changed each time the lines are repainted.

The outdoor advertising companies, if properly approached, can be induced to allow large vacant billboards to be used at a nominal cost for displaying the slogan. For instance, in Washington a space 30 ft. x 40 ft. located on one of the buildings in the business section was available for two months, and on it was displayed the slogan "The Reckless Driver Is a Criminal," illuminated with electric lights.

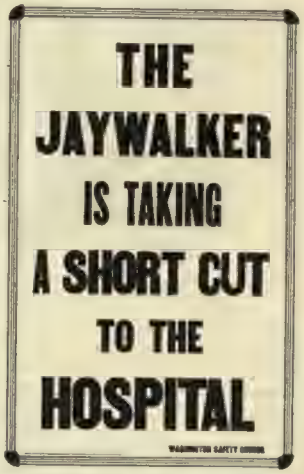
A striking poster displayed in the cars and changed frequently offers one of the most direct and effective mediums through which electric railways can reach the public with safety suggestions bearing on their own particular hazards. The Public Service Railway of New Jersey was one of the first to use this method. This company suspended from the ceiling in the center of each car a frame about 12 in. x 36 in. in size. In these frames were exhibited posters done with cartoons and safety slogans, usually calling attention to the fatal results of carelessness.



The Traffic Tower at Fifth Avenue and Forty-second Street, New York, Was Used for Poster Display



Done in Blue Letters on Yellow, This Was Displayed in Vehicles



This Poster Was Displayed on the Sidewalk Signs. It Was Printed in Black on Green

That safety can be visualized and that lasting results of benefit to the community can be obtained are shown by the opinions of men who were instrumental in backing the poster campaign in Washington.

W. F. Ham, president Washington Railway & Electric Company and president Washington Safety Council, says: "The continuous poster campaign conducted in Washington has proved to be one of the most effective means of reaching the public and obtaining their cooperation. It has largely assisted in producing a good accident reduction in the past three months."

J. J. Boobar, vice-president and general manager Yellow Taxicab Company, states: "Results and my personal observation satisfy me that the plain marking in white of street crossings and safety zones and the display of posters with a punch at congested street corners and on street cars, taxicabs and trucks is the most efficient means of minimizing street accidents and carrying a lasting and impressive message to the pedestrians and the drivers."

Major Sullivan, superintendent of the Metropolitan Police, makes this statement: "The safety poster campaign, more than any other single activity, has helped the police department of Washington to curb recklessness and carelessness on our streets, and in two months has assisted in reducing the total number of accidental deaths 32 per cent, traffic deaths 43 per cent, and deaths to children 65 per cent."

A Relay Which Almost Thinks

By the Use of Current and Voltage Windings the Relay Operates with a Delay Which Varies with the Remoteness of a Short Circuit—It Can Be Made Operative with Power in But One Direction

BY S. L. GOLDSBOROUGH
Supply Engineering Department
Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.

A RELAY which operates with a degree of promptness depending on the distance of a short circuit from the source of power supply has recently been perfected by the Westinghouse Company. It is intended for the automatic sectionalizing of transmission lines in case of short circuit, under which condition both the excess current and the low voltage are utilized to determine the time delay. It is so designed that the time is directly proportional to the voltage and inversely proportional to the current; hence it is proportional to the quotient of voltage and current, or the impedance, which in turn is proportional to the distance included in the circuit.

Since the tripping time is dependent upon the distance of the relay from the short circuit, the relay nearest the fault will trip first, those farther away automatically increasing their time of operation in order to allow the relay nearest the short circuit to close its contacts and trip its circuit breaker first, thus cutting out only that section of the line which is in trouble.

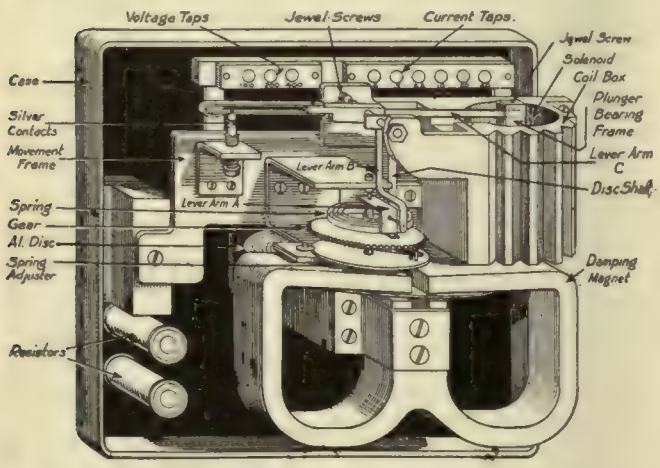


Fig. 1—Sketch Diagram Showing Principal Parts of the New Distance Relay

Figs. 1 and 2 show the principle of the relay. Essentially it consists of two elements, a current element and a voltage element. The former is similar to that used in the standard induction overload relay. An aluminum disk is driven by an electro-magnet against the damping action of the permanent magnet at a speed dependent in part upon the position of the permanent magnet and approximately proportional to the current. A countershaft carries the lever arm *A*, a spring and a spring adjuster, and is geared to the shaft of the induction disk.

The lever on *A* is movable on the shaft and carries the outer end of the spring, the inner end of which is fastened to the disk shaft. A rocker arm pivoted in jeweled bearings carries the contact on one end and the core of the voltage element on the other end. This voltage element consists of a solenoid sealed into a cast-iron case, having a number of ribs cast integral with it, the purpose of which is to keep the temperature of the coil within safe limits.

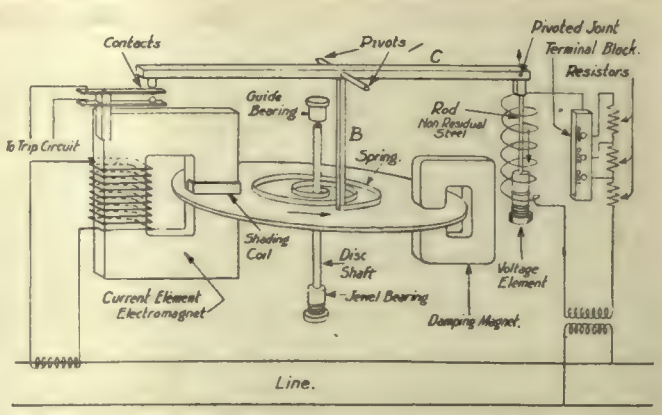


Fig. 2—Schematic Diagram of the Distance Relay

As the induction disk rotates the spring on the countershaft is tightened and causes a force to be exerted on the lower end of arm *B* in the direction of the arrow. This force tends to close the contact by rocking the pivoted beam against the pull of the solenoid plunger suspended on the end of arm *C*. Now for a given position of the damping magnet, the speed of the disk is, within limits, proportional to the current, therefore the time required to travel a given distance is inversely proportional to the time. The distance through which the disk must travel to close the contact is determined by the pull of the voltage coil, which is made directly proportional to the voltage. The time required to close the contact is, then, inversely proportional to the current, directly proportional to the voltage, and, therefore, directly proportional to the distance from the short circuit.

Where the distance relay is to be applied to a ring system or to a line having two or more sources of power, it is necessary to add an additional element to enable the relay to take account of the direction of power flow as well as the location of the trouble. This can be done by equipping the relays with a directional element (see Fig. 3) the contacts of which are in series with the contacts of the distance element and connected so that they close only when the power is flowing away from the busbars. The directional element is similar to the familiar reverse-power relay.

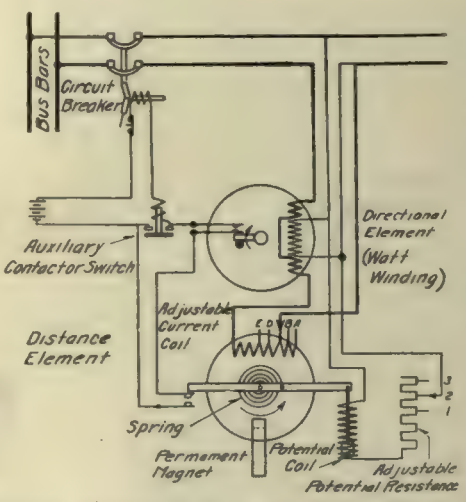


Fig. 3—Internal Connections of the Directional Distance Relay—Distance Element Below, Directional Element Above

Association News & Discussions

Transportation as Discussed by Southwestern Association

THE street and interurban railway section of the Southwestern Public Service Association held its first session at the Fort Worth convention on May 16. Alves Dixon, El Paso, Tex., presided.

Dr. Alden Coffey, Fort Worth, read the first paper, which was entitled "Human Maintenance in Industry." An abstract of this will appear in a later issue. Supplementing the paper Dr. Coffey stressed the importance of periodical physical examinations of employees to disclose lowered vitality. He suggested that every large company should provide for the employee who is nervous and irritable, and sometimes melancholy, because of worry over financial or domestic affairs. Each might establish some sort of a "listening post" where employees could explain their troubles. Many of the troubles will prove to be imaginary. At any rate, brooding over them has a tendency to increase labor turnover and decrease production. More attention should be paid to preventive rather than curative medicine.

At the same time, said the speaker, there are certain physical conditions which should determine the fitness of an employee to continue in his present service. Upon the development of any one of the following conditions, either he should be discharged or transferred to some other department where his particular ailment will not unfit him for the position assigned him, or jeopardize his fellow worker: Partial blindness, partial deafness, organic heart defect, hernia, varicose veins, venereal diseases, senility, diseased tonsils, decayed teeth and pyorrhea.

Dr. Coffey urged that every company have made a yearly health survey, stressing the importance of blood pressure tests together with exhaustive urinalysis. Measures to prevent disease increase output, decrease training costs, decrease labor turn-over, stimulate the good will of employees, reduce compensation costs, reduce loss of time due to sickness, protect the public from infectious diseases, remove causes of dissatisfaction, reduce death to a minimum, prevent accidents, protect employees from infection and give the employee an opportunity to discover a disease early enough to combat its deadly work.

In reply to a question as to whether the methods suggested by Dr. Coffey are being followed by any company in Texas he replied that no company, as far as he knew, had adopted strict rules in this connection, but several companies are following the suggested plans to some extent.

In reply to a query: "Can these examinations be made compulsory, or should they be entirely voluntary?" George H. Clifford, Fort Worth, said that such examinations have been compulsory in his organization (Northern Texas Traction Company) since the beginning. No man can enter the employ of this company unless he passes an acceptable physical examination or, following the recommendation of the examining physician, agrees to correct unacceptable conditions which have been brought out in the examination.

Mr. Clifford also explained a "dollar-per-month plan" for caring for sick and injured employees. This is a co-operative proposition among the employees, each contributing $1 per month to a sickness and accident fund. The contributions are matched dollar for dollar by the company. The fund thus accumulated is ample for its purpose.

H. S. Mann, Chicago, recommended that the purposes of a physical-examination plan be explained to all employees, to eliminate misunderstanding. Dr. Coffey agreed that the whole proposition is a matter of education and must be thoroughly understood by each employee in order to be effective. It must be diplomatically handled by company officials in order that employees be not offended.

Following Dr. Coffey's paper, N. S. Hunsden, director of the State Board of Industrial Education, spoke on "Educational Opportunities for Industrial Workers." He recommended the establishment of vocational-training classes in every electric railway organization.

In the past, said Mr. Hunsden, there has been no plan for training people vocationally other than the haphazard hit-and-miss practice generally found in big prosperous industries. There had been no consistent training, other than that given the foremen of the different departments, until recent years, or since the World War. He explained that, as a result of the Smith-Hughes law passed in 1917, funds of the national and state boards are dispensed through the state board to the local school. The benefits are not confined to the people in the industries.

The leaders of vocational training classes, he said, should be selected with care from the ranks of employees and should not come from among officials of the company or heads of departments. Their services should be voluntary.

Mr. Hunsden complimented the Northern Texas Traction Company for sending a representative to take certain training under the State Board of Vocational Training. This leader has since been conducting vocational training classes among the employees of the Northern Texas Traction Company. At a meeting and banquet held in the Texas Hotel on May 15, 1923, certificates of graduation were given the car inspectors of the company who had completed work outlined by the instructor along lines suggested by the state board. The state, he said, has sufficient funds to continue the work during the coming year and he understood that the Legislature plans to supply funds so that vocational training may be carried on indefinitely.

Luke Bradley, Houston, Tex., expressed approval of Mr. Hunsden's work, stating that there is much of personal satisfaction in helping one's fellow men, to which end vocational training not only demands, but deserves serious consideration.

Next on the program was J. T. Porter, Fort Worth, who read a paper on the "Reduction of Maintenance Expense Through Reclamation Work." An abstract is given below.

Reclamation Work Reduces Maintenance Expense*

BY J. T. PORTER
Master Mechanic Northern Texas Traction Company, Fort Worth, Tex.

RECLAMATION work begins with the human element. A clean, healthy body and an active mind enable a man to profit by the educational and training programs that are within his reach today as never before. What a man must realize is his duty to himself, to prepare himself for better work tomorrow. The principles of the electric railway business must be kept before our employees and they must be encouraged to develop their knowledge of cost values, accident hazards, etc.

Efficiency is one of the greatest elements in human progress, but men, like materials, may be allowed to go to waste if not reclaimed.

In the broad sense of the word all maintenance is reclamation. Our maintenance costs are reduced and production is speeded up by the application of all practical labor and time-saving devices. Machines that save time and

*Abstract of paper read before street and interurban railway section of Southwestern Public Service Association, at the nineteenth annual meeting, Fort Worth, Tex., May 15 to 17, 1923.

labor require fewer, though better-trained operators, and the reduction in necessary physical exertion further encourages a higher class of production and a better morale in all sections of the shop.

The possibilities of reclamation work are greatest in the mechanical department. Here the variety of materials is greater, and the number of articles needed is larger than in other departments, but there are opp rtunities in all departments. In Fort Worth hardly a day passes but that we find some small way of improving the reclamation methods with little increase in overhead expense.

Our reclamation department is housed in a 40-ft.x36-ft. section of the truck shop and is provided with 350 shelves of various sizes, bins for scrap copper and waste, spare controller racks, glass racks, 560 small bolt bins, armature rack for taking care of "O. K." armatures, and a bench with a vise and air connections for use in reclaiming material. This department is in charge of an all-round competent man who has two other men under him.

It is the rule of the shop that nothing is junked or laid aside unless it has been through this room. All material removed from cars, no matter how useless it may appear to be, is carried there for inspection and all requisitions on the general storeroom are issued there. The men are required to turn in an old part before an order for a new one will be issued.

The following statement of maintenance costs for the first three months of 1923, as compared with the same period for 1922, shows the results which we have had in reducing our maintenance expense, a large part of which we are sure was due to our reclamation and educational programs.

During the first quarter of 1922 the company spent for maintenance of car bodies, trucks, and air and electrical equipment of all types of cars a total of $47,576.69. During the same period of 1923 the amount was $41,592.14, a decrease of $5,984.35 or 13 per cent.

During the first quarter of 1922 forty-four cars were put through the carpenter and paint shops for heavy repairs and painting at a total cost of $10,818.28. In 1923 fifty-six cars were put through at a cost of $12,052.73. That is 37½ per cent more cars were turned out with only a 10 per cent increase in cost.

Deducting from the totals for the first three months of each year the costs of repairs to cars put through the carpenter and paint shops, there remains a total saving in running repairs of $7,219, or 20 per cent.

During these two periods the number of employees in the mechanical department remained about the same, namely 153 in 1922 and 150 in 1923. In the first three months in 1922 it was necessary to make 606 changes on all our cars, while in 1923 it was necessary to make only 513 car changes, or a decrease of 93 car changes or 15 per cent over 1922.

Merchandising Transportation*

By Richard Meriwether
Vice-President and General Manager Dallas Railway, Dallas, Tex.

THE term "merchandising transportation" has come into popular usage among members of the street railway fraternity only within the last year or two. It would, therefore, appear that traction managements have recently discovered a new element in their business, and that it is taking a first rank position among the problems of the industry.

Merchandising transportation is the development of the transportation service furnished by street railways along lines which will attract patrons other than those who from necessity must use the street cars. To incite a desire upon the part of the public to use the service at other times than when from necessity they must go to their business and home again by means of the street railway requires true salesmanship. The traction business has become a highly competitive one; and, as in other competitive businesses, the art of salesmanship must be called into play in order to produce the maximum results.

Let us examine this problem of merchandising from the traction manager's standpoint, in order to determine some of the sales factors that enter into it. While the mere fact that there are street cars is a notice to the public that a service exists, the frequency of the service largely determines the number that will ride. The development of the light-weight, one-man safety car, affording a means of giving more frequent service at less expense, has furnished a most excellent means of selling rides.

The speed at which the car travels is another important factor; and every effort should be made to afford the public not only a frequent service but a rapid one. The safety car has enabled street railways to improve their schedule speeds, by reason of the quicker starting and stopping qualities of the car, and the elimination of loss of time in giving signals from the conductor to the motorman.

The appearance of the equipment is another element which figures in the sale of the service. An attractively painted, clean, smooth-running car will certainly invite patronage. Not only should the car be attractive in appearance, but the motorman and conductor, likewise, should be in keeping with their surroundings.

The handling of the car by the motorman and the handling of the passengers by the conductor play a most important part in satisfying the patrons so as to develop future business. The motorman who brings his car to a smooth, easy stop; who accelerates his car gradually, and whose every action assures the passenger that he is in the hands of a safe, careful operator, helps materially in completing a satisfactory sales transaction. Likewise, the conductor who greets his passengers with a smile, who answers questions pleasantly and in a businesslike manner, and who is willing at all times to assist in every way possible in making his passengers comfortable, promotes an inclination on the part of the patron frequently and continually to buy the service.

Type of equipment is also a potent factor in the merchandising of transportation service. Cars that are easy to enter and to leave; with steps reasonably low; with wide aisles which permit one to move in the car, even though it contains standing passengers, without undue crowding; and with a seating arrangement affording comfort to the rider, will add no little to the patronage of the traction company.

As an indication that traction companies recognize this fact, the side-seat car, which is conceded to be an uncomfortable one to ride in and is not popular with the public, is gradually being superseded. Further, many of the newer types of cars are now built with small wheels, which permit the use of a low step.

In the merchandising phase of the traction business, every official and employee of the company plays his part as a sales medium; and, likewise, every physical element of the property has its bearing as a sales factor. And, finally, a management that has won the good will of the public will receive more patronage than one whose public is antagonistic.

*Abstract of paper read before street and interurban railway section of Southwestern Public Service Association, at the nineteenth annual meeting, Fort Worth, Tex., May 15 to 17, 1923.

Convention of Associated Advertising Clubs of the World

THE annual convention of the Associated Advertising Clubs of the World will be held in Atlantic City, June 3-7, and there will be an accompanying large exhibit, including foreign and domestic general advertising, industrial advertising and public utilities advertising. The hotel reservations indicate the largest attendance in the history of the association, and the number of foreign delegates to be in attendance is unprecedented. Among the addresses will be one by Floyd W. Parsons on "What Advertising Has Done and Can Do for Public Utilities," one by Bernard J. Mullaney, Chicago, on "Public Utilities in Connection with Community Advertising" and a committee report on standardization of industrial advertising literature, presented by J. C. McQuiston. The Associated Public Utilities Advertising Association will meet at the St. Charles Hotel, Tuesday morning, Tuesday afternoon and Wednesday morning. The speakers include: Grover C. Maxwell, former secretary Ohio Public Service Commission; W. H. Boyce, general manager Beaver Valley Traction Company; P. H. Gadsden, vice-president United Gas Improvement Company; James O'Shaughnessy, executive secretary American Association of Advertising Agencies; W. S. Vivian,

Middle West Utilities Company; J. C. McQuiston, manager publicity department Westinghouse Electric & Manufacturing Company; Francis H. Sisson, vice-president Guaranty Trust Company of New York; W. H. Hodge, manager advertising department Byllesby Engineering & Management Corporation, and W. B. Strandborg, Portland Railway, Light & Power Company and vice-president Thirteenth District, Associated Advertising Clubs.

As a supplement to the convention, on Friday, June 8, the McGraw-Hill Company will provide a special exhibit of industrial advertising at its building, Tenth Avenue and Thirty-sixth Street, and is arranging for an inspection tour of the offices and a luncheon for the benefit of delegates to the convention. Included in the exhibit will be displays of industrial advertisements, industrial market data and other material of special interest to industrial advertising men. After the inspection trip a selected number of industrial motion pictures will be exhibited.

C.E.R.A. Car-Braking Tests

A SERIES of car-braking tests have been completed under the auspices of a committee of the Central Electric Railway Association. They were inaugurated following a paper read at the January meeting of the C.E.R.A. by H. C. De Camp, which was abstracted in this paper for Jan. 27, 1923, on page 172. These tests were made May 15, 16, 17 and 18, over the tracks of the Terre Haute, Indianapolis & Eastern Traction Company, between the towns of Lebanon and Crawfordsville, Ind.

The tests were made to determine the most efficient way to stop a car, and the distance required for making the stop. The cars tested included a heavy interurban car, a double-truck city car, and a Birney safety car. The necessary apparatus was installed on each car to get a complete record of the variable elements in making stops under different conditions. Straight air brakes, automatic air brakes, and dynamic braking were employed. It was found that from speeds below 10 m.p.h. the car could be stopped in a shorter distance with dynamic braking than by the use of air, while at higher speeds the air brakes stopped the car in a shorter distance.

The members of the committee on tests of the C.E.R.A. who were present, were S. W. Greenland, H. C. DeCamp, G. K. Jeffries, and Prof. D. D. Ewing of Purdue University, who was in charge of the tests. The executive committee of the American Electric Railway Engineering Association was represented by Charles H. Clark of Cleveland. The Ohio Public Utilities Commission was represented by T. H. Barke, inspector of safety appliances, and H. M. Evans. The Indiana Public Service Commission was represented by D. E. Mathews, chief inspector. Others in the party were: R. W. Emerson and Terence Scullen, Cleveland Railway; Harry Coleman, Indiana Service Corporation; C. E. Masterson, Northern Indiana Power Company; S. D. Hutchins, B. H. Hartsock, C. W. Mailphant, H. Wood, L. Wilcox and P. B. McGinnis, Westinghouse Air Brake Company; Charles Ives and E. S. Gunn, General Electric Company; L. E. Earlywine, secretary Central Electric Railway Association; W. L. Galay, W. E. Blowers and Merle Aldrich, Purdue University.

New Englanders Discuss Education

ON MAY 10, 1923, a joint meeting was held in Providence, R. I., of the United Electric Railways company section of the American Electric Railway Association and the New England Street Railway Club. The program consisted of entertainment, felicitations from a number of prominent visitors, a running fire of wit and humor from the toastmaster, Alonzo Williams, and an address on education by Prof. W. H. Timbie of the faculty of the Massachusetts Institute of Technology.

Prof. Timbie explained that in his attempt to interest the Boston Elevated Railway in co-operative schemes of education he constantly met the question, "What will this do for the men in the employ of the railway?" It was finally agreed that the educational problem is larger than any scheme of co-operation.

The speaker explained further that the problem is one of training every man in the industry to make the most he can of his own ability and to secure the highest position that he is capable of filling. Furthermore, there is the bringing of new blood into the industry, in order that the industry may not get into ruts. The American idea of vocational education is not only to train a worker to give him the greatest possible skill in his present work, but also to train him to progress.

An example cited by Professor Timbie was the course in practical electricity recently completed by 140 employees of the Boston Elevated Railway. At a dinner given by the company at the Harvard Club in Boston, the president of the board of trustees returned to these employees the tuition fee of $5 each, which they had paid, with these remarks: "We are not giving you a present, we are not giving you any bonus, we are making an investment. I consider the five dollars which we have invested in each of you the best five-dollar investment the company ever made."

In connection with the co-operative efforts which are being made by the Boston Elevated Railway and the M.I.T., one opportunity is afforded the railway employees in the form of evening courses. Men may take a course in engineering four evenings a week. They can, if they so desire, enter the day course with credit for work done in the evening course. It is hoped that scholarships can be arranged to enable the evening-course men to take the day course as soon as they are prepared for it.

Under a new plan, the Elevated Railway is taking on each year two M.I.T. juniors who have maintained a high standing at the Institute, and giving them an opportunity alternately to work on the railway property and in the Institute. A student works with the railway for three months and then exchanges places with another student who has been engaged on his studies. After three years of this alternating procedure, the student is granted a master's degree. The work is continuous for the three years with the exception of scattered short vacations of a total duration of four or five weeks per year.

While with the railway the student starts in as a motorman or conductor, and goes through the several departments. He learns the practical side of electric railway work, along with the theory, and his theory is translated into the terms of electric railway work. He lives in the atmosphere of the electric railway while he is studying.

While this plan has been in operation only about a year, the results are already very satisfactory. A plan similar in principle has been in operation in co-operation with the General Electric Company for four years, involving about forty men each year.

Professor Timbie explained that the co-operative work between the Boston Elevated and the M.I.T. is the outgrowth of the work of the committee on education of the American Electric Railway Association, of which Edward Dana, general manager of the railway, is chairman. Mr. Dana is not asking other railways to do what he is not willing to do himself. He is trying to follow out the recommendations in the report of the committee presented last year at Chicago.

American Association News

Plans for Increasing the Membership

AT A MEETING of the American Association committee on company and associate membership, held in New York City on May 24, plans were laid for an active campaign during the summer. The "prospect list" has been divided among the committee members and individual study will be given the case of each "prospect." A circular, outlining the advantages of membership by pointing out what the association is doing, will be prepared as an aid in the campaign.

The committee members in attendance were: W. H. Sawyer, East St. Louis, Ill., chairman; H. H. Norris, New York City, and E. P. Waller, Schenectady, N. Y. J. W. Welsh, executive secretary, was also present.

Equipment Maintenance Notes

Portable Pneumatic Jack Makes Handy Device

WHERE truck overhauling work is done only at infrequent intervals, and the expense of elaborate machinery for raising car bodies is not warranted, the portable pneumatic jack is a handy device. Apparatus of this sort, built by the Buffalo & Lake Erie Traction Company, Erie, N. Y., has proved very



Pneumatic Jacks Easily Moved Anywhere in the Carhouse Are Used for Lifting Car Bodies

useful in one of the carhouses, where there is occasional need to remove a truck.

Each jack consists of a cylinder 18 in. in diameter and 14 in. in height. It is connected by a flexible hose to the compressed air system at any one of many conveniently located outlets, and the flow of air into the cylinder is controlled by an engineer's valve attached thereto. One jack is put on each side of the track and a section of rail placed on the piston heads of the two cylinders.

Two men are required for this operation, one at each jack. They can by careful observation and proper manipulation of the air valves keep the cross rail very nearly horizontal. After the car body has been raised far enough for the trucks to be pushed from under, the jacks are replaced by horses. From ten to fifteen minutes is required to remove a truck. The operation is reversed in lowering the bodies down upon the trucks after the work has been completed. Heights are then checked by measuring from the underside of sill to the top of the rail.

The portable feature of this apparatus consists of a separate two-wheeled truck, as shown in the accompanying illustration. It works on the same plan as a barrel truck, inasmuch as the edge is inserted beneath the cylinder base, and when the handle is lowered, the cylinder is tipped over and rests in a cradle. The heavy jacks are easily moved from place to place by this means.

Covered Transfer Table

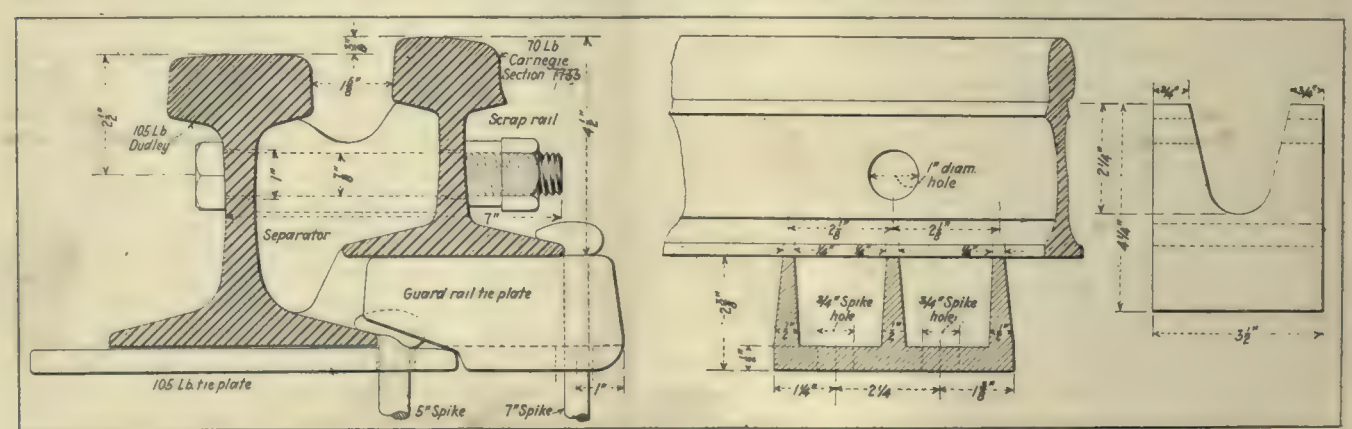
WHERE open transfer tables are used, stormy weather conditions are likely to interfere with the work, and in the case of moving cars which have been recently painted and are not thoroughly dry there is danger of spotting. This difficulty has been solved in the Harvard shops of the Cleveland Railway by providing a covering for the transfer table. This was added partly to protect the cars and partly as a protection to workmen who are required for shifting the cars during stormy weather conditions.



Covered Transfer Table in Harvard Shops of Cleveland Railway

Guard Rail with Inside Spiking of Main Rail

AN ACCOMPANYING illustration shows a type of construction used extensively by the Lehigh Valley Transit Company, Allentown, Pa., for T guard rail which permits of inside spiking of the main rail. For the guard, scrap rail is used, but of course only such lengths as have a fairly thick ball and one side in fair condition. With this type of construction it is unnecessary to cut off the inside of the base of the rail in order to give clearance for the installation of the guard. In the construction illustrated, 105-lb. Dudley T-rail is used for the main rail and 70-lb. Carnegie section 7033 for the guard rail. A special guard-rail tie plate is used underneath the guard, a separator of special section being required.

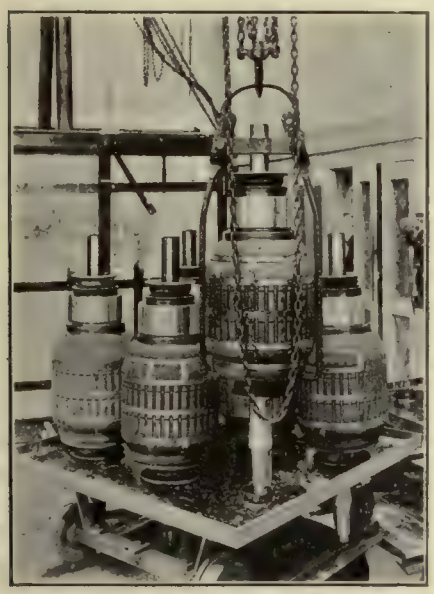


Guard-Rail Construction Used on All Curves Above 4 Deg. in Open and Paved Track of the Lehigh Valley Transit Company
At left, cross-section of construction. In center, cross-section of guard-rail tie plate. At right, end view of separator

Transfer Car Handles Armatures for Baking

By John S. Dean
Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company

IN CONNECTION with the process of dipping armatures in an insulating varnish and then baking them so as to increase the life of the windings the problem of the most economical method of transferring armatures to and from the oven must be solved for each individual installation. In connection with some ovens a monorail transfer system is used where the armatures are hung on carriers that run on an overhead



Convenient Car for Handling Armatures While Baking

rail construction. On others, special stands mounted on wheels are used to carry individual armatures. In some cases these armatures are transferred from the stands to racks built in the oven, while on others they run the stand containing the armature into the oven and leave the entire outfit inside the oven during the baking process.

One very common method used is to construct a narrow-gage track running from the dipping tank into the oven, on which are run specially designed cars made to hold a number of armatures in a vertical position commutator end up. A type of truck used by one operator for this work is shown in the accompanying illustration.

The body and floor of the car are constructed in the form of a tray equipped to hold the armatures in a vertical position while draining. This tray collects the excess varnish which runs from the armatures, and thus the floor is kept clean and free from varnish drippings. The wheels of the car are fitted with ball bearings, which make it possible for one man to push the car in and out.

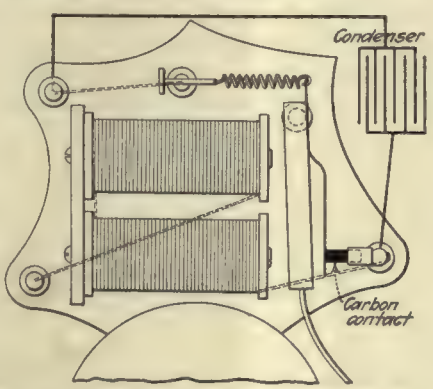
The floor of the car is provided with holes conveniently spaced to hold the maximum number of armatures in an upright position, commutator end up, thus economizing oven space during the baking process. The holes in the car floor are also fitted with short pieces of pipe extending above the bottom of the tray to prevent any excess varnish from draining down on the clean armature shafts.

This design of car has been found to work out very economically in service, as it facilitates the loading, draining, handling and baking of the armatures.

Eliminating Sparking at Crossing-Bell Contact

THE Portland Railway, Light & Power Company, Portland, Ore., has several crossing bells of ordinary make-and-break type which continually gave trouble due to the burning of the contact. These bells are shunted around 80 ohms resistance.

Experiments were made with spring contacts in order to provide a working contact at the break, but the result was not satisfactory. Finally, a carbon contact was arranged as shown in the accompanying illustration, the carbon being mounted in a brass holder. Results were excellent, but still further to eliminate the arc a telephone condenser, of 1 microfarad capacity, was



Carbon Crossing-Bell Contact Which Has Proved Effective in Eliminating Blistering

shunted around the contact. Now, there is no blister formed at the contact as formerly, and the wear of the carbon is so slight as to require replacement only at long intervals. Contacts of this type have now been in service for more than two years, and no failures have resulted which could be attributed to them.

Greasing Trolley Wire Reduces Wear

FOR several years the Lehigh Valley Transit Company, Allentown, Pa., has been obtaining good results from greasing its trolley wire. Miller trolley shoes are used on a number of the lines, and at one time it was apparent that these were causing considerable wear of the trolley wire, as the roofs of cars showed an accumulation of particles of copper. Greasing the wire was undertaken to remedy this condition



The Grease Reservoir and Piping Are Installed Inside Car

and careful observations indicate that it has done so.

An old double-pole car is used for the greasing. One pole is used for operating the car, while the other is equipped for the greasing operation. Accompanying illustrations show the reservoir, piping and greasing shoe. The grease used is Houghton's L Nos. 3 and 4, manufactured in Philadelphia, Pa. It is placed in a reservoir inside the car and is fed from this by air pressure through piping and hose to the trolley shoe, which greases the wire as it slides along.

The reservoir is 12 in. x 32 in. and has a plugged opening at the top for filling. The air is piped from the air reservoir to a center connection of this grease reservoir. A cut-out cock installed adjacent to the reservoir permits regulation of the air pressure and a gage indicates the pressure employed. The grease is

forced out of the bottom of the reservoir, through a ¾-in. pipe connection, thence is led to the roof through a ⅜-in. pipe. A cut-out cock is used in this line also for cutting off the supply.

In order to provide for movement of the trolley base, the connection from the roof to the trolley pole is made with flexible hose. A ⅜-in. iron pipe is led along the trolley pole, and



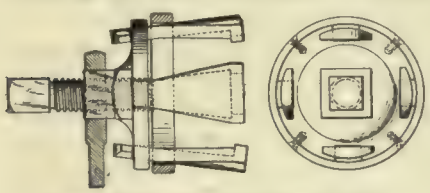
Greasing Shoe and Basket

again at the shoe a hose connection is used. The greasing shoe has a hole drilled through the center for the connection, and the grease is forced through this and oozes out into the shoe. It is thus spread along the groove in the shoe and so greases the trolley wire as the car operates.

In order to catch any particles of grease that might fall from the shoe a sheet-iron basket of about 12 in. x 12 in. is hung under the shoe. At an air pressure from 60 to 80 lb. 9 gal. of grease is distributed on 16 miles of trolley wire. The present practice is to grease the wire at intervals of from three to eight weeks.

Handy Type Pinion Puller

MANY methods and devices are used in the various shops of electric railways for removing pinions from armature shafts. The old method of driving a wedge between the back of the pinion and the motor housing has been abolished, in most



Convenient Type of Pinion Puller

cases, in favor of some type of pinion puller. The wedge method frequently resulted in damage to the armature bearing collar and motor housing. A convenient type of pinion puller successfully used in the Harvard shops of the Cleveland Railway is shown in the accompanying illustration.

This pinion puller consists of a heavy metal plate with slots in which are inserted four T-shaped dogs. A removable band or ring holds the dogs loosely in place. To remove a pinion the dogs are spread outward so as to pass over the outside of the pinion and are then hooked over the inside face. The ring is then slipped down over them to hold them tightly in place. There is a heavy screw which works in the end plate and presses against the end of the armature shaft. By turning this jackscrew with a long-handled wrench, pressure is exerted on the pinion teeth from the rear, and this pressure pulls the pinion off. The outside end of the metal plate has a squared portion, so that a wrench can be placed on it to hold it in position while the pinion-pulling operation is taking place. By the use of different-sized rings the same pinion puller can be used to remove pinions of varying sizes. This particular type of pinion puller is the invention of Christian Reinker and has been patented by him.

Rail Made Positive Pole for Welding in Havana

THE annual report for 1922 of the Havana Electric Railway, Light & Power Company discloses at least one advantage for the double-trolley system used in that city. The statement is made that in track welding from the trolley circuit in Havana the track is made the positive electrode, so that the company gets one advantage of a motor-generator welder without the complications. Since the greater part of the heat in an arc is at the positive electrode there is an advantage in having the rail the positive pole. A puddle of metal will thus be maintained at the welding point, so that the molten metal which is being applied will form a better union with the rail. Where connections are reversed and the rail is connected to the negative side, there is a tendency for the molten metal to fall on a comparatively cold surface, so that an imperfect weld may result. During 1922 the company ordered two more arc welders and now has four. They are being used extensively.

New Equipment Available

New Low-Energy Relays

THE Westinghouse Electric & Manufacturing Company has added to its line of relays low-energy instruments, to be known as the low-energy Type CO and low-energy Type CR relays. Each is made in 4 to 12-amp. and ½ to 2½-amp. ranges.

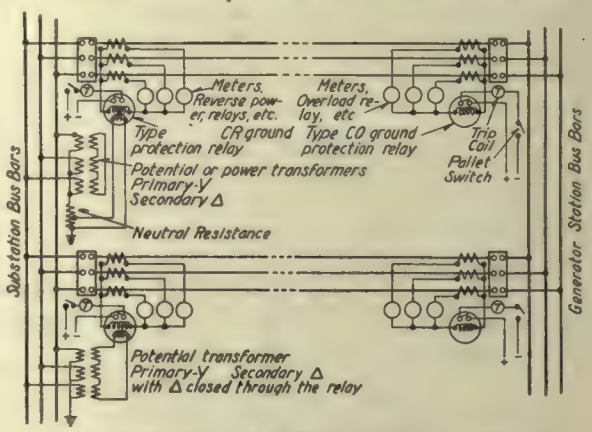


Diagram Showing the Method of Using CO and CR Ground Protection Relays

In the higher range the CO relay is designed for use where low-ratio bushing-type current transformers are the only convenient means for supplying energy to the relay. It should be used for line sectionalizing and the overload protection of power transformers where the low energy type is necessary.

The lower ampere range is intended for the differential protection of generators, large motors, etc., where a sensitive relay is desirable and where the current transformers on both sides of the main winding can be exact duplicates, but it is too sensitive for the differential protection of power transformers.

The low-energy CR relay in the 4 to 12-amp. range is intended for line sectionalizing to protect against short circuits in exactly the same way as the standard CR, except that the low-energy type is necessary where the transformers are of the bushing or any other type that can carry only a small secondary burden. The ½ to 2½-amp. relay is used as a ground relay for automatic sectionalizing of transmission lines. Only one ground relay is required for each circuit, and short circuits are taken care of by line relays.

The News of the Industry

Amended Contract Ready

Electors of Saginaw on June 25 Will Vote on Fifteen-Year Grant with Ten-Cent Cash Fare

After a series of conferences between the City Council of Saginaw and Otto Schupp, grantee under the last two street car-bus franchises, a modified contract has been prepared and accepted by the bondowners' protective committees on the defunct Saginaw-Bay City Railway.

Because of the elimination of some of the objectionable features of the last two contracts those who have striven during the last two years to obtain a satisfactory solution of the transportation problem in Saginaw believe that the measure will be approved by the electors on June 25, particularly as it has the support of a friendly city administration.

Since Aug. 10, 1921, the city has depended upon buses of all types to transport the people. Attempts have been made to secure the return of street cars with motor bus extensions, but they have all failed, once through an error of an election inspector and the other time by about 100 votes short of the majority of three-fifths necessary for approval. A franchise for city-wide motor bus operation attracted only a few more votes than the negative vote cast against the railway proposition. These contracts were submitted during the administration of a hostile Council. Since the election on April 2, a new Mayor and two Councilmen chosen on a street car platform have taken the lead in preparing a new contract.

Many believe that the previous grants were defeated on account of the provision fixing the grant at twenty-five years, stipulating the rate of fare for only two years and authorizing the State Public Utilities Commission to settle disputes and adjust the rate of fare on a value fixed after the two-year period, on application of either party.

The franchise now before the electors was drawn with these provisions eliminated. The term of the grant is fifteen years, and fares are to remain unchanged during this entire time. The cash fare is to be 10 cents, with four tickets for 25 cents. Six school tickets will be sold for 25 cents. There will be universal transfers.

Any disputes between the operating company and the City Council will be settled by arbitration, the three members of the board to be citizens of Saginaw. One is to be appointed by the company, one by the City Council, and the other by the Federal Judge of the district of which Saginaw is a part. Should either party fail to appoint an arbitrator, the other, upon proper written notice, can appoint the third and the decision of the board is final.

Before the franchise can be assigned, the company must deposit $400,000 for the purpose of rehabilitating the property and certain renewals must be made upon thirty days notice from the Council. The company is relieved of all paving and repaving, but must keep the paving between and 12 in. outside of its tracks in proper repair. Should the company fail to do this work, the city will proceed, charging the cost to the company. To assure payment, the grantee must maintain a revolving fund of $1,000 for the purpose.

The board of directors is to consist of nine members, and not less than six to be citizens of Saginaw. The directors must be approved by the Mayor and Circuit Court judges.

The present rolling stock of the company will be used, but must first pass inspection by the Council, and before motor buses are purchased the specification must be approved by the Council.

The frequency of service and type of equipment, routes to be traversed, seating capacity, etc., are to be regulated by the City Council.

The city has the right to purchase the property at any time. If the company and the City Council cannot agree upon the price, it is to be fixed by arbitration.

Ninety days are allowed for the organization of the company after acceptance by the city, as it was believed it would take that long to get the property out of the bankruptcy court.

Wages Increased Three Cents an Hour in Alton

The receivers of the Alton, Granite & St. Louis Traction Company and the employees have arrived at a settlement, whereby wages are to be increased 3 cents an hour, effective May 1, 1923.

On the city lines in Alton, where practically all the cars are of the one-man type, the new wage, in cents per hour, is as follows:

For the first three months	45
Next nine months	48
One year and thereafter	52
Four cents additional for men when operating one-man cars.	

On the interurban lines, the new scale, in cents per hour, is as follows:

For the first three months	50
Next nine months	53
One year and thereafter	56

The East St. Louis & Suburban Railway and the East St. Louis Railway are arbitrating wages, but have agreed on all working conditions.

Adopts Resolutions

Spartanburg Chamber of Commerce Makes Requests of City Council—Railway Seeks Abandonment

The railway problem affecting residents of Spartanburg, S. C., for more than a year appears to be on its way toward a settlement. At a recent conference held at the Chamber of Commerce at which were present officials of the Spartanburg Chamber of Commerce, members of the State Railroad Commission and a number of citizens, two resolutions were passed by the board of directors. The first one, suggested by Charles O. Hearon, a director of the Chamber of Commerce, was in the nature of a request to the City Council of Spartanburg to explain to the people its aim and policies with respect to the South Carolina Gas & Electric Company. The second resolution, offered by John B. Cleveland, was a request to the City Council to protect the railway from the competition of jitneys over the streets on which electric cars are operated.

H. H. Arnold, member of the Railroad Commission, gave the commission's views on the situation. He outlined events from Jan. 10, when the company gave notice that it would cease to operate, and through the time that the commission took over the property. He asked for the hearty co-operation of the citizens of the city, saying that if the local railway was dismantled, junked or sold the entire city would suffer. He announced that the 5-cent fare started some weeks ago at the suggestion of the commission had more than doubled the number of passengers carried, but that, as had been expected, there had not been a corresponding increase in revenue.

B. T. Earle, president of the Bank of Commerce and a director in the South Carolina Gas & Electric Company, spoke in behalf of the railway, saying that the people of Spartanburg rode too much in automobiles.

The meeting was the result of a hearing before the commission on April 27 held at the request of the South Carolina Gas & Electric Company with a view to providing the people of Spartanburg with information as to the progress the railway was making under the direction of the South Carolina Railroad Commission. At the hearing the railway sought permission, in the absence of constructive suggestions, to abandon its urban and suburban electric lines.

Attorney Earle, representing the company, reviewed its recent history. He referred to the destruction of the

dam at Gaston Shoals on Broad River some years ago as a reverse to the company, followed by the trying war-time period. He told then about the appointment of the receiver, the subsequent winding up of the affairs of the old company and the organization of a successor. The new company, he claimed, was paying $35,000 annually in extra and unnecessary interest, because the city refused to make certain concessions. Further, he brought out the fact that less than 2 per cent of the population of the city of Spartanburg patronized the electric railway cars. So the company felt that the only way was to abandon the local railway system unless the commission was able to work out some scheme whereby the company could operate on a paying basis. He said that the company was willing to try the bus as an experiment, but that the Council would not permit the test.

President Tripp said expenses could not be lowered appreciably if the present service was maintained.

New York State Men Accept New Scale

New York State Railway employees in Syracuse, Utica and Rochester voted on June 1 to accept a new wage scale offered by the railway calling for 51, 53 and 55 cents an hour, an increase of 5 cents over the present scale. The employees sought 65 cents as top scale.

Wants Jitneys Barred from Detroit Streets

A move has been made to bar jitneys from the streets of Detroit upon the recommendation of Ross Schram, assistant general manager of the Department of Street Railways. The city's legal department is prepared to proceed with the injunction proceedings and May 31 was set by the judge as the date for hearing arguments in the case. Detroit jitneys have been operating since last fall without licenses. When former Mayor James Couzens sought to bar them from the streets, a temporary injunction was granted.

Jitney Men May Protest New Birmingham Ordinance

The Jitney Owners & Drivers' Association of Birmingham, Ala., may contest the legality of the agreement recently made between the Birmingham Railway, Light & Power Company and the city regulating the operation of the jitneys after July 1.

The agreement, as explained previously in the ELECTRIC RAILWAY JOURNAL, does not interfere with the operation of suburban jitneys, but states that no jitneys will be allowed to operate in the down town section on streets where there are railway lines, or within four squares of a railway line.

The railway, if this ordinance is put into effect on July 1, will reduce cash fares from 8 cents to 7 cents and sell tickets at 6 cents, with an additional charge of 2 cents for transfers, the same as at present.

Chicago Rapid Transit Report Nearly Due

Some of the Particulars of Major Kelker's Forthcoming Plan Are Made Public—Recommends Co-ordinated System

An extract from the proposed physical transportation plan for this city was submitted on May 21 by Major R. F. Kelker, Jr., consulting engineer for the local transportation committee of the City Council. The full report will probably be ready about June 15.

The plan, involving an estimated expenditure of $375,833,000, embraces a unified system of surface and elevated lines and subways. In recommending this plan Major Kelker states that it was based on the following general premises:

1. Long-haul traffic should be carried on rapid transit lines.
2. Short-haul traffic should be carried on surface lines so operated as to serve the feeders to the rapid transit lines.
3. Transfers should be permitted and encouraged between surface and rapid transit lines in order to make rapid transit service accessible to all.
4. Existing transportation systems should be unified and operated as a single system, thereby eliminating competition.
5. The transportation system of the city should be planned for the metropolitan area in advance of traffic demand.
6. Existing structures, as far as possible, should be used so as to form a part of a complete rapid transit system, and
7. The transportation system should connect the various outlying commercial centers of the city in such a manner as to provide rapid transit without passing through the congested central business district.

An interesting feature of the recommendations is the proposal for the unification of all lines in one system, thus giving passengers a universal transfer from one class of service to another. With a unified system, it is expected that 80 per cent of the traffic will be carried on the rapid transit lines and 20 per cent on the surface lines. At the present time the reverse is true. It is the intention that the surface lines should be the feeders to the rapid transit lines, and thus eliminate the necessity of traveling long distances in street cars. In this manner a large number of through route cars, which pass through the loop, would be discontinued and thus relieve traffic congestion in the central business district.

The construction program has been divided into two periods, as follows: A first period construction, which includes such parts of the plan as are urgently required and can be definitely located at this time, and a second period of construction, which includes the remaining parts of the plan. A considerable extent of elevated track is proposed, as shown in the accompanying table.

It is understood that in its broad features the Kelker plan does not differ greatly from the All-Chicago Council plan of last year or the Ridgway-Parsons-Arnold report of 1917.

TRACK MILEAGE OF THE UNIFIED TRANSPORTATION SYSTEM—MILES OF SINGLE TRACK

	Existing Systems	First Period of Construction	Second Period of Construction	Construction Period Totals	Unified System Total
Rapid transit subways	None	17.6	37.3	54.9	54 9
Elevated railroads	162.0	137.0	67.2	204.2	366.2
Total rapid transit lines	162 0	154.6	104.5	259 1	421.1
Street car subways	None	None	2.5	2.5	2.5
Street railways	1,060.0	153.0	95.5	248.5	1,308.5
Total mileage	1,222.0	307 6	202.5	510.1	1,732.1

Inquiry Into Schenectady Strike Scheduled—Eight Cars Operating

The much postponed inquiry into the causes of the Schenectady trolley strike, under the auspices of the State Industrial Commission, was scheduled to start on May 31.

The Schenectady Railway is operating eight heavily screened cars without police guards. So far no disorders have been reported and the cars which have been operated have had few passengers. It is anticipated the next move of the company will be to obtain a court order restraining jitneys from operating in the city of Schenectady. This order will be opposed by the city administration on the ground that complete service has not been restored by the company inasmuch as it has 128 cars in its carhouses.

No attempt has yet been made to operate interurban service. The labor people are organizing a "We Will Walk" club in anticipation of a court ruling which will discontinue jitney service.

With the state police called upon to enforce the provisions of the anti-Klu-Klux-Klan law recently signed by the Governor, it is not anticipated that this body will be sent into Schenectady. Nor is it expected that there will be any cause for its presence.

It now looks like a long drawn out struggle with thousands of dollars lost to Schenectady merchants, much inconvenience to the public and heavy financial expense to the railway company.

Seven Traction Bills Signed by New York Governor

Among recent legislation affecting the transit situation in New York Governor Smith signed seven bills. They are as follows:

Johnson bill amending section 93 railroad law, relative to maintenance and repairs of roadways and approaches of bridges over railroads by villages of less than 1,200 population.

Van Wagenen bill amending section 78 railroad law, relative to length of coal jimmies, by extending time within which all cars operated must conform to section. to July 1, 1924, a period of one year. This chapter, 519 of the laws of 1923, affects a number of urban electric as well as steam roads.

Farrell bill directing Coney Island & Brooklyn Railroad, Brooklyn City Railroad and Nassau Electric Railroad companies to restore service on Park Slope line. Brooklyn, and authorizing the Transit Commission to waive issuance of transfers.

Clayton bill authorizing the Transit Commission to extend for one year operation

of the Church Avenue line of the Nassau Electric Railroad, Brooklyn, without exchanging transfers.

Reich bill authorizing the Transit Commission to extend for one year operation of the Park Avenue line, Brooklyn, without exchanging transfers.

Knight bill amending the public service commission law, by increasing the number of officers of corporation required to file reports with commission, who may verify such reports and giving the commission discretionary power to extend the time within which corporations required to file reports may do so.

Sheridan bill amending chapter 788 of the laws of 1917, relative to the removal of the Manhattan Railway structure at Forty-second Street, New York City, by providing for extinguishment of all rights to structure, or to maintain same and assessing cost.

International Railway Officer Refuses to Act as Witness

Herbert G. Tulley, president of the International Railway, Buffalo, refused to be a witness at the investigation into the causes of the strike of platform men on the local and interurban lines started last July. It was intended to hold the hearing before Bernard L. Schientag of the New York State Industrial Commission. President Tulley refused to answer questions and said the strike was a dead issue and the company was operating cars with trained and efficient employees on normal schedule.

Upon advice of counsel, President Tulley refused to produce the books and records of the traction company and contended from the start of the investigation that the commission had no jurisdiction or power to act in the matter. Among the witnesses at the inquiry were James H. Vahey of Boston, attorney for the Amalgamated Association; William F. Fitzgerald of the organization staff of the Amalgamated and Clarence F. Conroy, business agent of the Buffalo local. Coleman J. Joyce, general counsel for the Mitten interests of Philadelphia and Buffalo; James R. Sweeney of Penney, Killeen & Nye, counsel for the International, and President Tulley also attended the hearing but refused to participate. Mr. Joyce contended:

That the International has a complete organization of permanent employees working under a written agreement between the company and the present employees made Dec. 20, 1922, which provides for the manner and conduct of employment mutually satisfactory.

That the commission has no jurisdiction to make an inquiry into the cause of a strike of former employees which occurred July 1, 1922, because the controversy terminated by the employment of men now under contract and therefore no strike, lockout or industrial controversy exists or is susceptible of settlement.

Further objections were made by counsel for the railway to producing books and papers on these grounds:

That the commission has no authority to inquire generally into expenditures of the International for strike purposes or to inquire into the expendtures on account of the strike.

That the commission has no authority to inquire into action taken by the protective committee of the International bondholders referred to as reorganization.

That the commission has no authority to inquire into the revenue of the International or financial arrangements made by the company since July 1, 1922, or into the affairs of employees of the Philadelphia Rapid Transit Company, or into the books and papers of the International bondholders' committee or Philadelphia employees with respect to any matter mentioned in the subpoena upon the company's officers.

That no matter mentioned in the subpoena is relevant to the causes of the strike of former employees.

At the adjournment of the hearing, Commissioner Shientag said he would make a ruling later whether or not President Tulley would be compelled to testify at a continuance of the investigation.

No Agreement in Chicago

Company Is Firm in Its Stand that It Cannot Increase Wage—Mayor Seeking Arbitration

Negotiations between the Chicago Surface Lines and the men ended after a futile conference on May 28. Those attending the conference were Henry A. Blair, president of the Chicago Surface Lines; Guy A. Richardson, vice-president in charge of operation; John M. Roach, vice-president Chicago Railways; William Quinlan, president of the union; William Taber, secretary-treasurer, and J. J. Kehoe, recording secretary of Local No. 241. The 10-cent hourly wage increase demanded by the union was flatly refused and the meeting ended with no announcement of future conferences.

Following the breaking off of negotiations the Mayor conferred with both sides. He is seeking to have the wage controversy settled by arbitration. On May 31 he met Henry A. Blair, president of the Chicago Surface Lines, and Samuel Insull, chairman of the board of directors of the Chicago Elevated Railroads, at separate meetings.

Up to the morning of June 1 no break had come in the deadlock over wages, despite the efforts of the Mayor. Indications then pointed to the calling of a strike vote early in the week. Members of the union will meet on the night of June 4 and if such action is taken by the surface car trainmen a special meeting of the elevated railroad employees will be called immediately for a similar purpose.

The wage agreement entered into last year expired at midnight on May 31. It has been agreed that the old wage scale will be continued pending the outcome of the present controversy.

After the meeting last Monday Mr. Blair said:

We informed the officials of the unions that the Chicago Surface Lines cannot pay the 10 cents an hour increase demanded by the motormen and conductors. Officials of the union replied they are in duty bound to stand pat on the demands of the men. Settlement of the wage controversy is just as far away now as it was when negotiations started a few weeks ago. We have come to a brick wall so far as a settlement is concerned.

Mr. Blair was asked whether another conference would be held. He replied that he saw no logical reason why one should be held. As he expressed the matter:

Both sides have reached a point where an agreement seems improbable. The hearing on the fare finding of the State Commerce Commission has no bearing on the situation. The wage dispute is strictly a matter of business between employees and the employers.

Mr. Quinlan intimated that he is about to send for William D. Mahon, international president of the Amalgamated Association.

News Notes

Wages Advanced Five Cents.—An increase in wages amounting to 5 cents an hour has been granted blue uniform men and track workers of the Northern Massachusetts Street Railway, Athol, Mass. This is practically a 10 per cent advance and restores the scale in force before the cut of April, 1922, was put in effect.

Ready for Arbitration.—The fifth arbitrator for the wage issue affecting the employees of the Scranton Railway has been selected in the person of the Rt. Rev. M. J. Hoban, Bishop of the Scranton Diocese. The proceedings were scheduled to start on May 31. The subject to be arbitrated is simply wages, which affect the motormen and conductors, all of the shop crafts and the men in the track department.

Completes Pleasure Park.—The Chicago, Ottawa & Peoria Railway, Ottawa, Ill., has just completed the construction of a new pleasure park on Covel Creek, 4 miles south of Ottawa, on the Streator division. It was intended to open the park to the public on Decoration Day. This new park will provide a bathing beach that will accommodate 1,000 people at one time, boating facilities, a dancing pavilion, several riding devices and other buildings.

Contract Renewed. — The New Orleans Public Service, Inc., has renewed its contract for one year, beginning June 1, with its 4,500 workers, including conductors and motormen. The 500 other workmen, comprising the electricians, have a contract which may be reopened, by either party, on thirty days' notice. Contracts have been signed with the carpenters, blacksmiths and machinists in the employ of the company on the same hourly rate which is now in force.

Reorganization Deferred. — A postponement from June 1 to Sept. 1 in the proposed reorganization of the Pittsburgh Railways has been granted by the commission. The plan for the reorganization of the property, which has been under receivership since 1918, was started two years ago. In seeking the postponement those in charge acting in co-operation with the city of Pittsburgh told the commission that the preliminary proceedings are taking more time than was expected.

Reward for Loyalty.—All employees of the Johnstown Traction Company have been granted an increase in pay effective June 1. Those in the service three months or less than one year will be given a 2½-cent advance and those in the service one year will receive a 5-cent raise. This increase will bring the pay of three-month employees or those in the service less than one year up to 52½ cents and all employees of one year or more 55 cents. During the war-time period the hourly rate of pay was 60 cents.

Foreign News

A Turn for the Better at Leeds

The accounts of the Leeds (England) City Tramways for the year ended March 31 last show that the total revenue was £961,507, compared with £959,703 in the previous year. The working expenses were £599,983, against £702,250. After paying capital and other fixed charges and allowing for permanent way renewals there is a surplus of £91,491, as compared with a deficit of £43,266 in the previous year.

The Metropolitan Railway has now a bill passing through Parliament without opposition to authorize the raising of £2,000,000 additional capital. It is proposed to spend £790,000 on new rolling stock, £285,000 on the extension of the company's generating station, £168,000 on the electrification of the line from Harrow to Rickmansworth and £228,000 on widening the line.

The London Underground Railways and associated concerns are working on a scheme for facilitating the journeys of regular passengers living in the outer ring of the metropolis. The proposal is to issue combined season tickets available by underground railway tramcar and omnibus. The first trial started at Golder's Green on May 1. From this northern terminus of the Charing Cross & Hempstead Railway tramcars and buses run to and from places farther north and the through season ticket will enable the passengers to travel part of the way by railway and the rest of the way either by bus or tramcar and vice versa. The season ticket rates will work out cheaper than the combined ordinary fares and the passenger will not be restricted in the number of journeys he makes.

In Situ Rail-Hardening Process

Highly satisfactory tests have been carried out by the London County Council on a stretch of its tramways on the Victoria Embankment with Sandberg's *in situ* process of hardening the tread of rails. The object was to find how far the harder surface would remain free from corrugation, so a flat curve was chosen where the evil was very apparent. For a certain distance the rails were treated and the rest remained untreated. The test began in December, 1920, and was continued till February, 1923. During the period the corrugations on the untreated rails had to be ground out three times, while the treated track did not corrugate at all. The number of cars passing over it during the twenty-six months was 2,092,000. A further test of a more extensive nature is about to be begun. It may be recalled that the treatment consists in alternately heating and cooling the rail head until it is much hardened. A special machine is used to do this and the rails do not need to be disturbed.

It was expected that before the end of May practically all the tramways in Edinburgh will have been electrified. R. S. Pilcher, general manager, calculates that the cost of running the electric cars is about 5d. per car-mile less than the cost of working the old cable cars. When the whole system is electrified, it is estimated that there will be a saving in working expenses of £125,000 per annum.

Return Ticket Automatic Machines

What for the want of a better term is still described as the "booking" of passengers has been much facilitated at stations on the London Underground Railways by the use of "put your money in the slot" ticket issuing machines. So much has this been so that the companies are now beginning to experiment with return ticket slot machines at terminal stations. If the machines work all right the success of the arrangement is secure, as the trouble of taking a ticket for the return journey is removed.

English Southern Railway Electrification

It was announced toward the end of March that the work of converting to electric traction part of the suburban lines of the Southeastern section of the Southern Railway would be begun almost immediately. Particulars of the scheme have already appeared in these pages. The company hopes to be able to work forty trains an hour through London Bridge Station during the busy periods of the day. The first stage of the work will include the lines from Charing Cross, Cannon Street, and London Bridge to Dartford, all lines as far as Orpington and the Bromley branch and Mid Kent lines, the routes from Victoria and Holborn Viaduct to Bickley Junction, and the Crystal Palace line. It is proposed at first to have sixty eight-car trains. Probably a number of the cars will be reconstructed from existing rolling stock.

British Tramway Statistics

The Ministry of Transport has issued its annual return giving statistics of all tramway and light railway undertakings in Great Britain for the year ended Dec. 31, 1921, for companies, and March 31, 1922, for local authorities. The tables show that the total route mileage open for traffic at the end of the year was 2,579 miles, of which 1,756 miles were worked by local authorities and 823 miles by companies. The total gross receipts for 1921-22 were £32,523,339 as compared with £32,692,209 in 1920-21, and the total working expenditure £26,835,292, compared with £28,339,706, leaving net receipts amounting to £5,688,047 or £1,335,544 more than the corresponding figure for the preceding year. The number of passengers carried during the year was 4,256,268,692, a decrease of 413,647,712, or 8.86 per cent as compared with 1920-21. Car-miles run amounted to 332,079,865, a decrease of 13,073,720 or 3.79 per cent. Of the total car-miles run 98.24 per cent were electric car-miles.

London Tramway Excursions

It was announced at a recent meeting of the London County Council that on application to the tramway offices arrangements could be made for the conveyance of parties of children to the holiday resorts on the tramway routes. The charge for the hire of special cars is 7s. 6d. per car single or 10s. return for each 1d. of the ordinary fare for the journey. Last year 700 parties of children were carried on the cars of the municipal railway system.

Fascisti Favor Private Operation

Under the new Fascisti Government in Italy considerable progress is being made toward a change from public to private operation of public utilities. It is said that within a few months a good part of the steam railroads of that country will be turned over for operation to private companies, and it is quite possible that the government may sell them outright. The parcel post system is already in the hands of a private contracting company, the telephone system is about to follow, and it is rumored that the same course will be followed with the telegraph. Not many of the electric railway lines in Italy have been operated by the municipalities, but in a few instances this has been the case, notably in Milan. While no announcement has been made that the Milan municipal street railway is to be changed to private operation, there is a rumor that it may be turned back to the company which was formerly operating it, namely, the Milan Edison Company.

Italy Electrifies More Lines

There have been a number of extensions of electrification in Italy during the past year. One of the most important is the Genoa-Turin line, equipped on the three-phase system. Now, electric operation is in force all the way between Modane (at the Montcenis tunnel) and Genoa. Other divisions of the state railroads are being electrified. The line between Rome and Ostia (the harbor of Rome) will soon be put in operation with 2,600 volts direct current. The locomotives will be of the same general type as those on the Torino-Cirié-Lanzo-Ceres line. Another high-voltage direct-current line to be started this summer is that between Domodossola and Locarno in the lake district of northern Italy. This proposed line will use 1,750 volts direct current.

Financial and Corporate

Separation Sought

Bondholders' Committee Seeks Separation of Suburban System from the United Railways of St. Louis

The separation of the so-called Suburban system from the United Railways, St. Louis, and the independent operation of the former road is not only possible but probable, according to Sam B. Jeffries, one of the attorneys for the committee of bondholders of the Suburban system, who have asked the Missouri Public Service Commission for a valuation of the Suburban properties as an independent unit in the whole of the United Railways system. The committee acting for the bondholders includes Herman C. Stifel, John H. Longmire, A. C. P. Meyer and John L. Johnston. Besides Mr. Jeffries they are represented by Cleveland A. Newton and Marion C. Early, attorneys.

The Suburban lines include the Hodiamont Line and Fourth Street to the old Suburban Garden, the Kirkwood-Ferguson line and the Florissant line, the Sarah Street and the Union lines and the line to Meramec Highlands from Sarah Street West.

Bondholders Want Appraisal

The holders of the $6,500,000 bonds of the old Suburban company desire to have the property on which they hold a mortgage appraised in order to know what they can expect in the reorganization, said Jeffries. It has been intimated, he said, that the Suburban bondholders may have to take a cut in the par value of their securities in the reorganization which, in view of their present idea of the value of the properties, the bondholders do not feel would be equitable.

There are two issues of Suburban bonds. The underlying securities are of the St. Louis & Suburban Railway consolidated first mortgages amounting to $4,500,000 issued under a general mortgage. This issue was due April 1, last, and is now in default. There are six months of grace, however, before the foreclosure provision of the mortgage becomes operative.

Mr. Jeffries said that if the Suburban general 5s are not paid at the expiration of the six months period, the bondholders will have the opportunity of foreclosing and forcing a sale. In such event the property might be bought in by an independent company, or by the bondholders themselves.

One of the Suburban bondholders declared that the United Railways seemed to treat the Suburban properties as an "adopted child," and the Suburban bondholders were ready to take over their property and run it themselves. It is expected that the reorganization plans will develop a contest between the Suburban bondholders and the holders of the $9,790,000 Transit Company 5s as to which issue shall receive more favorable treatment.

Treasury Revokes Corporation Tax Income Ruling

The U. S. Treasury on May 21 revoked its decision of two weeks ago declaring exempt from income taxation corporation dividends distributed out of profits of earnings accrued prior to March 1, 1913.

It was said unofficially in Washington that the original decision amending the revenue regulations had resulted from a ruling on one particular case, and that a review of that case had convinced revenue officials that no general application of the determination should have been made.

The ruling now revoked was made on May 11 and was referred to in the ELECTRIC RAILWAY JOURNAL for May 19, page 862. It took the form of an amendment to the income tax regulations. It applied to the distribution to its stockholders by a holding corporation of profits accumulated by subsidiaries prior to March 1, 1913. Under the ruling profits so distributed were held to be non-taxable, though the provision was made that profits accumulated since Feb. 28, 1913, must be distributed.

$1,104,991 Net for Capital Traction

Results for 1922 Satisfactory to Board, Gratifying to Stockholders and Creditable to Employees

The net income of the Capital Traction Company, Washington, D. C., for the year ended Dec. 31, 1922, was $1,104,991. The number of passengers carried in 1922 was 3½ per cent less than in 1921, due to increased competition from bus lines and to the more extensive use of private automobiles. Automobile registration in the District of Columbia was more than 25 per cent greater than in 1921. The loss in revenue was greater than the loss in traffic because the rate of fare was, throughout the year, less than in the preceding year.

The following comparisons between the years 1921 and 1922 give a general summary of operations:

Operating revenue decreased	$507,156— 9.2 per cent
Operating expenses with taxes decreased	190,995— 5.0 per cent
Net income decreased	306,711—21.7 per cent
Car mileage decreased	204,754— 2.1 per cent
Revenue passengers decreased	2,587,402— 3.5 per cent
Total passengers decreased	2,526,491— 2.7 per cent
Operating ratio increased from	58.4 to 63.4 per cent

On March 1, 1922, by order of the Public Utilities Commission, the rate of token fare was reduced from five tokens for 35 cents to six for 40 cents, the cash fare remaining at 8 cents.

The Public Utilities Commission, after a hearing held Oct. 16, denied an application of the Federation of Citizens' Associations for a reduction in the rate of fare in effect on the lines of the Capital Traction Company, taking the same position held by it heretofore that the rate of fare should be the same on all street car lines operated in the District of Columbia.

Net additions to capital during the year were $265,669, and consisted chiefly

SUMMARY OF OPERATIONS OF CAPITAL TRACTION COMPANY, FOR YEAR ENDED DEC. 31, 1922

		1922	1921
Passenger revenue		$4,966,341	$5,472,924
Special car revenue		20	110
Total revenue from transportation		4,966,361	5,473,034
Revenue from operation other than transportation		27,682	28,165
Railway operating revenue		4,994,043	5,501,199
Operating expenses (62.97% of gross revenue)		3,167,211	3,220,740
Net operating revenue		1,826,832	2,280,459
Taxes assignable to railway operation		436,093	573,519
Operating income		1,390,739	1,706,940
Non-operating income		34,906	18,412
Gross income		1,425,645	1,725,352
Deductions from Gross Income			
Interest on funded debt	$280,300		
Interest on unfunded debt	22,433		
Miscellaneous rents	1,309		
Rent for leased roads	12,604		
Miscellaneous debits	4,008		
Total deductions		320,654	313,648
Net income		1,104,991	1,411,704
Profit and Loss Statement			
Credits:			
Balance beginning of year	$1,089,585		
Net income for year	1,104,991		
		2,194,577	
Debits:			
Dividends	840,000		
Miscellaneous	10		
		840,010	
Credit balance at close of year		$1,354,567	$1,089,586

CAR-MILE AND REVENUE AND TRANSFER STATISTICS OF CAPITAL TRACTION COMPANY

CAR-MILES

	1922	1921	1920	1919
City lines	8,582,366	8,818,335	8,894,931	8,558,385
Chevy Chase line	815,819	785,367	764,993	755,149
Washington and Maryland line	153,177	152,414	149,347	147,544
Total all lines	9,551,362	9,756,116	9,809,271	9,461,078

REVENUE AND TRANSFER PASSENGERS

	1922	1921
Number of passengers carried at 8 cents	15,303,295	13,719,351
Number of passengers carried at 7½ cents	...	38,820,788
Number of passengers carried at 7 cents	9,263,546	19,609,398
Number of passengers carried at 6½ cents	45,025,583	...
Number of passengers carried at 5 cents	972,779	984,369
Number of passengers carried at 3 cents	321,724	340,423
Total revenue passengers	70,886,927	73,474,329
Other passengers:		
1-cent inter-company transfer passengers	2,636,136	2,438,628
2-cent bus transfer passengers	1,009	...
Free bus transfer passengers	202	...
Capital Traction Company free transfer passengers	18,182,305	18,256,680
Other free passengers:		
Employees	883,835	951,395
Police and firemen	* 82,496	78,369
Total passengers	92,672,910	95,199,401

* Exclusive of policemen and firemen riding free while in uniform.

of betterments to track, additions to the conduit and cable system, the substitution of modern type stokers in four of the boilers at the Georgetown Power Station, and final payment on substation No. 4 building and equipment. This figure is net after deducting $111,137, the value of equipment abandoned at the Georgetown and Chevy Chase power stations.

The net increase in depreciation reserve for the year was $238,437, bringing the total reserve at the end of the year to $1,419,658, of which $690,000 is invested in government securities, $86,430 is held on deposit bearing interest, and $643,227 has been advanced for capital expenditures.

Tax accruals in 1922 amounted to $436,093, a decrease of $137,426 from the preceding year due to smaller revenues and the elimination of the excess profits tax.

It is interesting to note that the company now has in the service 126 employees (10.6 per cent of the total) who have been with the company twenty years or more.

It is explained that competition from the buses has had a tendency to increase, numerous applications being filed by the Washington Rapid Transit Company and others for the operation of bus lines, some of them paralleling the railway tracks. The commission has expressed its policy not to grant such parallel service. The Capital Traction Company joined with the Washington Railway & Electric Company in an application for permission to operate a bus line through Cleveland Park connecting with Capital Traction lines at Connecticut Avenue and Woodley Road and with the Washington Railway & Electric Company lines on Wisconsin Avenue and at Connecticut Avenue and Columbia Road. This application was granted and operation began in December. Transfers selling for 2 cents each are issued to the lines of both companies, and the loss or profit from operation shared equally.

Insurance policies on the principal properties of the company expiring June 22, 1922, were renewed for a period of three years at a slightly reduced rate. Fire insurance is now carried on the company's various properties in the sum of $4,822,900.

Ford Makes Short-Term Loan to Detroit

The City Council of Detroit, Mich., on May 22 authorized the comptroller to negotiate a short term loan to enable the street railway department to commence at once its work on extensions.

The Municipal Railway has outlined its building program for the summer, including some important extensions. In order that the department may not be delayed the money will be raised for this work at once.

The Street Railway Commission requested a loan of $2,500,000, but the Council decided not to borrow more than $1,000,000 until the increase in the city's assessed valuation is ascertained next month.

It has since been announced that Henry Ford has agreed to advance a short-term loan of $500,000 to the city at 4 per cent and that he is prepared to offer further to finance the city to the extent of as much as $10,000,000 at decidedly favorable interest rates.

The Legislature has increased the bonding limit to enable the expenditure for subways, but this matter is subject to further consideration before loans based upon increased valuations can be negotiated.

Receives Permission to Issue Bonds

The Public Service Commission of Alabama has granted authority to the Mobile Light & Railroad Company to issue 6 per cent mortgage bonds to the amount of $245,000 to refund bonds which have become due. The new bonds will mature on May 1, 1950. An operating statement presented to the commission showed a net income of $1,697 for April, after caring for all obligations and allowing for the sinking fund account. The total revenue of the company for April was $67,471 and the surplus after all operating expenses had been deducted was $3,781. A total of $2,083 was credited to the sinking fund account.

North American Company Increases Its Wisconsin Holdings

Control of the Wisconsin Traction, Light, Heat & Power Company has passed into the hands of the North American Company, through the purchase by the latter of the stock in the Wisconsin company held by John I. Beggs, Charles F. Pfister and Fred Vogel, Jr., Milwaukee.

The deal, according to Mr. Beggs, means only that the North American Company is extending its holdings of public utility properties in Wisconsin. Mr. Beggs said:

> The North American Company has been a stockholder in the Wisconsin Traction, Light, Heat & Power Company. It has been the second largest owner, and with the acquisition of the interests held in Milwaukee gains a controlling interest. It means merely the extension of the North American Company holdings in Wisconsin.

The company operates railway lines in Appleton, Neenah and Menasha, with 21.24 miles of track, and also operates motor bus lines. Its properties are valued at about $7,000,000 and annual revenues are about $1,500,000. The management of the property will remain unchanged.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Reorganization of Suburban Lines Being Arranged.—Le Roy T. Harkness of the New York Transit Commission, has announced that plans are being formulated for the reorganization and readjustment of the Long Island Traction Company and the Long Island Electric Railroad, both owned jointly by the Interborough Rapid Transit Company and the Long Island Railroad, and operating in Queens and Nassau Counties.

Will Subscribe to New Stock.—Stockholders of record of April 24 of the Washington Water Power Company, Spokane, Wash., have the right to subscribe to new 10 per cent stock at par. Payment for new stock will be due by June 15. The company has reported for the first quarter of 1923 net earnings of $499,378, equal to 2.72 per cent on the $18,330,200 capital stock outstanding. In the first quarter of 1922 net earnings amounted to $429,153, equal to 2.41 per cent on the $17,779,800 capital stock outstanding.

Bonds Offered.—R. L. Day & Company, Estabrook & Company, Harris, Forbes & Company and Merrill, Oldham & Company are offering at 98 and interest yielding about 6.25 per cent $3,000,000 of the Boston Elevated Railway 6 per cent ten-year gold bonds. The bonds are due on June 1, 1933 without option of prior payment. Of the proceeds of this issue of bonds, $700,000 will be used to reimburse the company for money used to pay at maturity on Jan. 1, 1923, a like amount of West End Street Railway debenture 4½ per cent bonds. The balance will be used to provide for extensions to the company's power station in South Boston, for new shops in Everett and for the George Street storehouses in Somerville.

Traffic and Transportation

Extra Pay for Politeness in Muskegon

The Muskegon Traction & Lighting Company, Muskegon, Mich., is going to make it pay to be polite. It has introduced a bonus plan for conductors and motormen based on the success of the platform men in being courteous and polite to customers. Under the plan the year is divided into two periods, the first bonus of $30 being payable on July 1 and the second on Jan. 1. The plan is retroactive to Jan. 1, 1923.

Every employee starts with a credit of 1,000 points, and all who have 800 points to their credit at the end of the six months period are to receive the full bonus. The company has prepared a special rule book. Deductions are made for the violation of certain rules. In addition extra points will be awarded for any outstanding acts of courtesy, loyalty or safety. Plans will be made for paying an additional sum over the regular bonus to employees who maintain the full 1,000 points at the end of the period.

The bulletin states that it is the purpose of the company not only to provide for the safety and comfort of the public, but also to see that the public receives courteous treatment. Further, that the employees are expected to treat the public politely and show the public consideration. As for the employees themselves, they must maintain a neat personal appearance while on duty.

George Steinwedel, president and general manager, said he believed that 90 per cent of the employees would earn the full bonus. Remarking that the purpose was twofold, Mr. Steinwedel said:

> We wanted some way to reward those employees who give us a little more than the full service. Under the old system we had no way to reward them. The bonus plan will provide a means. In the second place we wanted to impress on the public and the men that our aim is to give service.

The plan was well received by most of the employees. The company had been working out details since Jan. 1, and it was considered a part of the plan of the company started two years ago to win the popular approval of the public in operation of the street cars and the management of the company.

Buses Will Replace Railway in Brattleboro

W. A. Buttrick, vice-president of the Twin States Gas & Electric Company, has announced that motor buses will replace trolley cars in Brattleboro, Vt., soon and that tracks will be torn up. He says the company cannot be expected to operate the railway at a loss and claims that it may substitute bus service under the recent law putting bus lines under supervision of the Public Service Commission. A 10-cent fare for buses is proposed.

Safety Enters Amid a Great Din

Through the efforts of Barron Collier, Special Deputy Police Commissioner of Greater New York in charge of safety, Friday, May 25, was observed as safety day in the metropolis. Safety hour, beginning at 3 p.m., when schools are dismissed, and ending at 4 p.m., also was observed for the first time, and will continue to be observed every day throughout the remainder of the present school year.

At 3 o'clock on May 25 New York heard safety hour ushered in with a din such as it seldom has experienced. For one minute factory, ferry and steamboat whistles blew, church bells rang, taxicab, truck and other motor vehicle horns honked and other loud noises were made from Yonkers to the Battery. This din will be repeated every day now at 2:59 o'clock in the afternoon until June 29.



Aunty J. Walker as Shown in the Placards

The outstanding feature of the day was the introduction of "Aunty J. Walker," a woman figure whose special mission in life is to break folks of the habit of jay-walking, or crossing streets at places other than the regular crossings. Aunty J. Walker was introduced to New York through the medium of posters, car cards and an animated figure who appeared at prominent points throughout the city with Mr. Collier while the Commissioner was addressing the crowds.

Aunty J. Walker proved such a striking feature and impressed the jay-walking lesson so strongly on the New York public that the Advertising Section of the American Electric Railway Association has arranged with Mr. Collier to use the figure in a series of window signs and posters for the benefit of the entire electric railway industry. The signs are now being made and samples of them soon will be forwarded to companies as a part of the regular service of the Advertising Section.

Council Will Pass Over Mayor's Veto in Seattle

The Seattle City Council will pass over the veto of Mayor E. J. Brown the ordinance providing for increasing fares on the Seattle Municipal Railway lines from 5 cents to 10 cents cash, or three tokens for 25 cents. The veto causes a delay in placing the ordinance in effect, as thirty days is required to pass after the bill has been vetoed before it is placed in effect, which means that the increased fare will not become effective before July 5. The delay in passing the carfare ordinance complicates further the railway's financial situation, in that it makes necessary a return to the warrant basis for supplies, and a possible issuance of warrants for the June 10 pay day of trainmen.

Mayor Brown in his veto message expressed the opinion that the time has arrived to solve the question for all time of the rewriting of the "impossible" $15,000,000 purchase contract, and that terms, conditions and methods for its solution should be agreed upon before any increase of charges for street car fare is made.

No plan has been decided upon by the special committee appointed to formulate a proposal for the rewriting of the contract. Councilman E. L. Blaine suggests that the proposal to pay $1,000,000 yearly for a period of nineteen years and six months from the date of purchase, based upon an interest rate of 4 per cent, should be telegraphed to the bondholders, but this action has not been agreed upon. In the meantime, Mayor Brown would shift the entire responsibility to the City Council members, expressing a willingness to cooperate in any possible way with them.

Another plan proposed by the city utilities committee for possible increase of revenue is the installation of the $1 weekly pass plan, providing for the issuance of transfer to the lines of the Seattle & Rainier Valley Railway on the same basis as to municipal lines. Walter M. Brown, general manager of the Rainier lines, states that his company would be willing to accept the proposition should the city agree to remit the payment of the annual franchise tax of $11,000 and would agree to pay the company on the same basis now paid the municipal lines for carrying police and firemen, amounting to $4,000 yearly.

Bus and Trollibus Rights Granted

Two ordinances were passed recently by the City Council of Philadelphia granting subsidiaries of the Philadelphia Rapid Transit Company franchises for operating a bus line on Roosevelt Boulevard and a trackless trolley line on Oregon Avenue. When the ordinances were finally placed before the Mayor he vetoed them, but the Council over-rode the veto. The Mayor objected to a provision for a 10-cent fare. Repre-

sentatives of the Philadelphia Rapid Transit Company said that the buses, for which the Roosevelt Boulevard grant provides, would be running before the end of the year. In Oregon Avenue, where the trackless type of trolley car will be used, preparations for its installation probably will proceed at once.

Beeler Organization Will Study Charleston Situation

The Charleston Consolidated Railway & Lighting Company has employed the Beeler organization of New York City to make a study and report on the street railway conditions in the city of Charleston, S. C., with a view to determining, if possible, some solution of the present serious financial difficulties with which the company is confronted.

This company says that its railway revenues for the first four months of 1923 were practically $40,000 less than for the first four months of the previous year, while the cost of operation has not fallen in anything like this proportion, with the result that the company is experiencing substantial losses every month. The revenue for the first four months of 1923 has failed by $13,749 to meet actual operating expenses, exclusive of depreciation and interest on the value of the street railway properties, it is stated.

Just what changes will be made are at present problematical, and it is likely that no changes will be made until the Beeler organization has completed its investigation and made its report. The company already uses the one-man car and is attempting to apply other operating economies. The use of the automobile, the reduction of the force of men at the Charleston Navy Yard, the loss to Charleston of the destroyer fleet during the winter and other similar influences have brought about a shrinking of traffic with a consequent reduction of revenues, amounting to more than the savings effected by the economies.

One-Man Cars Allowed in Johnstown

One-man cars, prohibited in the city of Johnstown, Pa., by ordinance, can now be operated. The City Council at a recent special meeting passed a repealer of the old ordinance that provided that every car should be manned by a motorman and conductor. Efforts to pass the repealer have been under way for the past year. The repealer was put through by a vote of three to two, Mayor Joseph Cauffiel, who previously opposed one-man cars, voting in favor. The ordinance repealed was signed on March 19, 1921, and allowed only "trailers" with one man in charge.

One-man cars will be added to the Johnstown Traction Company equipment gradually, according to Lee T. Shannon, general manager. In presenting an appeal for the ordinance repealer Mr. Shannon stressed the safety measures as applied to one-man cars and stated that the reduced revenues of the company made the curtailment of men necessary.

Carrying out the agreement with the City Council the company announced a tariff of rates effective May 24, the new tariff pertaining to school children only. The tariff makes decreases in existing rates and provides a special rate of fare of 5 cents per passenger for all children actually going to and coming from school on all days when the schools are in session. The rate of fare is applicable, however, only between the hours of 8 a.m. and 5 p.m. Tickets are to be sold children in packages of 20 for $1 upon proper identification. The rate of fare is reduced from 7 to 5 cents for school pupils on all the city lines. On the Windber line, the new tariff reduced the fare from 10 cents to 5 cents on each zone.

Single and Double Deck Buses for Louisville Railway

The Louisville Railway will start a bus service during June. Announcement to this effect was made recently by J. P. Barnes, president of the company. Twenty-four buses will be put in service immediately and the plans of the company call for additions to this original fleet as rapidly as public demand justifies such action. Of the twenty-four cars twelve will be single-deck vehicles, costing approximately $7,500 each, being built in Cleveland, and twelve double-deck, costing about $9,000 each, which will be supplied by the Yellow Coach Company, Chicago. The former will seat twenty-five persons, while the double-deck buses will seat sixty-eight.

The single-deck buses will be upholstered in leather, finished in mahogany, with pneumatic tires, and will be painted royal blue. They will have Bender bodies mounted on White chassis. They will be operated on a ten-minute schedule. There will be one operator on the single-deck cars, and two on the double deck. The fare will be 10 cents.

At the start of the service the twenty-four buses will be divided between two lines. One will run from the center of Louisville out into the southern district, where jitney traffic in the past has been the most active. The other will run through the southeastern section of Louisville. Neither line will traverse streets over which cars of the Louisville Railway are operated.

The Kentucky Transportation Company has been organized to operate the buses. All of its capital stock of $200,000 is held by the Louisville Railway.

Transfers Cost Two Cents.—On payment of the usual 6-cent fare on any car of the Arkansas Central Power Company in Little Rock, Ark., an extra 2-cent fare carries with it a transfer to any line in North Little Rock. This rule applies also to passengers boarding cars in North Little Rock for the city of Little Rock.

Extends Pass Plan.—The Tacoma Railway & Power Company has been given permission by the State Department of Public Works to extend for three months the $1 weekly pass on its lines in the city of Tacoma. The period will end Aug. 26, 1923.

Proposal Made to Operate Radial Lines.—A proposal has been made by Sir Henry Thornton to operate certain radial lines in the Niagara Peninsula in conjunction with the National Railways. The Canadian *Financial Post* points out that this proposal really means that where electric lines can be operated to advantage the National Railways will meet the situation.

Investigates Right of Buses.—General Manager R. A. Leussler of the Omaha & Council Bluffs Street Railway has stated that the company counsel is investigating the question whether buses have a legal right to operate on the city streets. The Boulevard Transit Company recently took out a permit to operate two buses on the streets of Omaha, charging a 10-cent fare.

Big Excursion Business Being Done.—The electric railways in the Central Electric Railway Association territory are conducting an extensive excursion business, particularly in the states of Indiana and Ohio. Tariffs covering these movements are issued by the association, the fare for the round trip on the certificate plan being in all cases one-and-one-half times the one-way fare.

Loop Plan in Late August.—The United Electric Railways, Providence, R. I., will not be able to put its looping plan into effect until late in August or early September because of the special work that will be required to make the necessary track connections. This eight-loop plan cutting all crosstown railway lines was referred to in the ELECTRIC RAILWAY JOURNAL, issue of May 12. The plan, it is believed, will relieve much of the congestion in the city center.

Will Test One-Man Cars.—The Chicago, Ottawa & Peoria Railway, Joliet, Ill., is considering the possibility of trying out the one-man interurban cars on its property. The company will test the cars on the division of 18 miles between Streator and Ottawa, and if successful, similar service will be put into effect on the entire property of 107 miles. Arrangements are also being made to operate the city service of four cars in La Salle and Peru with one-man cars.

Rerouting to Improve Service.—In the interest of better service to its patrons the Dallas Railway on April 15 put into operation its first crosstown service, the old Main line passed out of existence and two new stretches of track were opened up. The new crosstown line and the rerouting of the Mount Auburn-Park View lines were the major changes. Other changes consisted of rearranging the linking up of various lines. The changes took place without any serious difficulties.

Personal Items

J. C. Smith Heads Quebec Company

Shawinigan Company Executive Elected to Succeed E. A. Robert as Head of Quebec Railway, Light, Heat & Power Company

Julian C. Smith, who has been elected president of the Quebec Railway, Light, Heat & Power Company, has been a prominent figure in Canadian hydro-electric developments during the past few years.

Mr. Smith was born in Elmira, N. Y., in 1878 and was graduated from Cornell University in 1900. He began his business career as draftsman with Wallace C. Johnson, consulting engineer at Niagara Falls, N. Y. Later he went to



© International Press Service

J. C. Smith

Shawinigan Falls, Quebec, as assistant engineer to Mr. Johnson. In 1903 he allied himself with the Shawinigan Water & Power Company of Montreal as superintendent, and three years later was advanced to general superintendent. Subsequently, he became general superintendent and chief engineer and in 1913 he was made vice-president. At present, in addition to his position of vice-president and general manager of the Shawinigan company, he is executive of all of the subsidiary companies.

Mr. Smith has taken an active interest in engineering societies—American, Canadian and British—and has made many important contributions to technical literature.

Besides occupying the chief executive's office of the Quebec company, Mr. Smith is vice-president and general manager of the Shawinigan Water & Power Company, president of the Public Service Corporation, Quebec, president of the Canada Carbide Company, vice-president of the Dominion Engineering Works, Ltd., and director of the Dominion Bridge Company and president of the Canadian Electro-Products Company and North Shore Power Company, Three Rivers.

George A. Iler Joins Pennsylvania-Ohio Electric Organization

George A. Iler has been appointed electrical engineer of the Pennsylvania-Ohio Electric Company, New Castle, Pa., and has assumed the duties of his new position, coming to the company from Atlanta, Ga., where for the last year he was radio engineer for the Atlanta *Journal*, constructing and operating its big broadcasting plant.

Mr. Iler succeeds C. A. Harrington in the Pennsylvania-Ohio organization. After serving in the Sixteenth Regiment of Pennsylvania Infantry in the Spanish-American war Mr. Iler joined the U. S. Navy as first-class electrician and was promoted to chief electrician. Following his naval service he devoted his energies to electrical work in various parts of the country in charge of construction and operation of power generating plants, transmission systems and general electrical engineering work, completing his education with a post-graduate course at the Georgia Institute of Technology.

Among other important work in which Mr. Iler has been engaged was the building and operating of the power transmission lines in the New River coal district, West Virginia, and the early application of electrical power to mining projects there. He was also chief operator in connection with the construction of the 100,000 hp. hydro-electric power plant for the Georgia Railway & Power Company at Tallulah Falls.

E. J. Nash has been acting general manager of the Butte Electric Railway since the death on March 19 of J. R. Wharton, who was general manager.

Rodney J. Selby of Des Moines has been appointed assistant director of the Iowa Committee on Public Utility Information. Mr. Selby goes to this committee from the Des Moines *Capital*, with which he has been associated for a number of years. He is a graduate of Drake University and has had many years' experience in the newspaper business.

Elbert G. Allen, formerly chief engineer of the Philadelphia Rapid Transit Company, is now in the Boston office of Stone & Webster, Inc., as consulting engineer. It is not the first time that Mr. Allen has been associated with Stone & Webster. In 1901 he entered their employ, remaining there continuously for twenty years. Early in 1922 Mr. Allen was appointed chief engineer of the Philadelphia Rapid Transit Company.

C. H. Dahl Advanced

Merits of Work of Research Engineer Recognized by His Appointment to Assistant to Vice-President at Winnipeg

C. H. Dahl, statistician for the Winnipeg Electric Railway for the last three and one-half years, has been advanced to be one of the assistants to the vice-president, A. W. McLimont.

The promotion of Mr. Dahl is recognition of his services as statistician, in which capacity he has made a number of investigations into various problems of the company arising in the operation of its electric, gas and railway properties. He has figured prominently in the adjustment of rates and fares, wage negotiations and general operating efficiencies.

Prior to his connection with the Winnipeg Electric Railway Mr. Dahl was a case investigator for the Wisconsin Railroad Commission, and as such his work consisted in analyzing and reviewing testimony and evidence submitted in rate cases in appeals for changes in rates as well as drafting decisions in connection with such applications. The experience gained there has no doubt been very helpful to him in the performance of his work in Winnipeg.



C. H. Dahl

Mr. Dahl prepared himself for public utility work while a student at the University of Wisconsin. He is a graduate of the college of letters and science of that university, and while there he took the course provided by that institution in railway transportation, public utilities, statistics, money and banking and kindred subjects in political economy.

George I. Plummer, superintendent of traffic of the Dallas Railway, was elected chairman of the electric railway section for the 1924 meeting of the Southwest Public Service Association at the recent convention held in Fort Worth. W. R. Burns, assistant secretary-treasurer of the Dallas Railway, was re-elected secretary of the section for the ensuing year. Both Mr. Plummer and Mr. Burns have long been active in the affairs of the association.

Safety Manager in Providence

Harrah K. Bennett has been appointed safety manager of the United Electric Railways, Providence, R. I. He has already assumed his new duties.

Previous to joining the railway at Providence he had a long period of experience in electric railway business. He entered railway work with the Fitchburg & Leominster Street Railway in December, 1898, as carhouse foreman. He advanced gradually and was appointed claim agent for the company in 1905 and held this position until September, 1917, when he resigned to



H. K. Bennett

go with the Bay State Street Railway, Boston, afterward the Eastern Massachusetts Street Railway.

Mr. Bennett was successively superintendent of employment of the Bay State Street Railway, Boston District claim agent and general claim agent. When the latter office was abolished in 1920, he was appointed manager of the Melrose-Woburn division, remaining there until this division was consolidated with the Chelsea division.

He then went into the claim department of the Liberty Mutual Insurance Company at Boston, where he was chief examiner of claims in the branch office, supervision department. He continued with this company until his appointment to the United Electric Railways.

Mr. Bennett has been interested in safety work for many years, and while in Fitchburg gave several talks in the public schools and before other organizations along the line of prevention of accidents. While with the Eastern Massachusetts Street Railway he continued his interest in this phase of railway work and was responsible for that part of the standardized form of breaking in "blue uniform" men by the company which dealt with the instruction of new men from the safety standpoint. In 1911 he was president of the American Electric Railway Claims Association.

John J. O'Connor, superintendent of transportation for the Muskegon Traction & Lighting Company for the last three years, has resigned. The resignation was reluctantly accepted by George Steinwedel, president of the company. The retiring official was forced to give up his work because of ill health. Mr. O'Connor, formerly a conductor, was promoted by Mr. Steinwedel from the ranks at the time of the reorganization. He is given credit for aiding greatly in the re-establishing of the Muskegon company. Roy Strevo, a dispatcher and a former conductor of the company at Muskegon, is acting as superintendent.

Joe Gill Heads Southwestern Public Service Association

Joe H. Gill, assistant general manager of the Dallas Power & Light Company, Dallas, Tex., was elected president of the Southwestern Public Service Association at the annual meeting at Fort Worth on May 17. Mr. Gill was born on Sept. 25, 1886, at Kerrville, Tex. He received his elementary education in the public schools of Paris, Tex., and was graduated from the University of Texas at Austin in June, 1910, with the degree of electrical engineer.

Immediately after receiving his degree Mr. Gill entered the employ of the General Electric Company at Schenectady. He remained with that company until December, 1912, when he entered the employ of the Texas Power & Light Company of Dallas as resident engineer. He was engaged with the company at Dallas until October, 1917.

From October, 1917, to April, 1918, Mr. Gill was with Stone & Webster as electrical engineer on the design of the American Ordnance Base Depot in France and in April, 1918, he enlisted with the United States Army as a private in Battery B, Third Trench Mortar Battalion, Fort Crockett, Tex. On July 4, 1918, he entered the officers' training camp at Fort Monroe, Va., and was commissioned Second Lieutenant of the Coast Artillery on Sept. 25, 1918. He served as instructor in the Coast Artillery Training Center until Dec. 7, 1918, at which time he was discharged from the army.

Mr. Gill returned at once to Dallas and on Feb. 1, 1919, re-entered the employ of the Dallas Power & Light Com-



J. H. Gill

pany as power salesman. He was successively promoted from power salesman to chief engineer and from chief engineer to assistant to the general manager and then to assistant general manager.

Obituary

Elisha H. Talbot, retired publisher and founder of the *Railway Age* and other periodicals, died recently at his home in New York. He was eighty-three years old. Mr. Talbot was born in Ohio. When he was nineteen he established a weekly newspaper in Winterset, Ia. Besides the *Railway Age* he founded the *Interurban Railway Journal* at Indianapolis, Ind., during the period when interurban railway construction was at its height.

William A. Geoghegan, forty-four years old, a member of the Cincinnati Rapid Transit Commission, died at his home in that city on May 20, as the result of heart disease. Mr. Geoghegan had been a member of the Rapid Transit Commission since 1919, when he was appointed by the late Mayor John Galvin. He was reappointed by Mayor George P. Carrel in 1921. From 1913 to his appointment on the Rapid Transit Commission, Mr. Geoghegan was one of the presiding judges in the Hamilton County Common Pleas Court.

John E. Sickels, long an attorney of the Interborough Rapid Transit Company, New York, N. Y., died on April 14. Mr. Sickels became connected with the law department of the traction company many years before the lease of the Manhattan Railway to the Interborough was effected. After being admitted to the bar, in Florida, he became a member of the firm of Henderson & Sickels in Tallahassee. Later he was admitted to the bar in the State of New York, and about December, 1897, he entered the law department of the Manhattan Railway.

Capt. Alexander B. Guigon, sixty-five years of age, for more than thirty years prominently identified with the traction business in Virginia, died recently in his home at Richmond. Captain Guigon was one of the original incorporators of the Richmond Traction Company, now an integral part of the Virginia Railway & Power Company in Richmond, and at the time of his death was general counsel for the company. Captain Guigon was prominent in the merger of the Richmond Traction with the Virginia Railway & Power Company. His pallbearers included E. Randolph Williams, vice-president of the Company; George H. Ingles, A. H. Herrmann and G. B. Williams, all officials of the railway.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

English Electric Has Many Important Railway Contracts

At the annual general meeting of the English Electric Company held in London on April 25, Sir Charles Ellis, the chairman, said that the past year was one of the worst the engineering trade had ever experienced, so that he thought it was a satisfactory result to show a balance on profit and loss account of £318,264 as compared with £363,659 for the previous year.

The orders received during the year were in value one and three-quarter times those received in the previous year, and in the first three months of this year the improvement had been more than maintained. There had been a most encouraging revival in the application of their standard manufactures to steel works, coal mines, and other industries. Improvements in designs and the development of new lines of machinery had been actively continued, and had assisted the company in obtaining contracts, particularly in electric railway and water power work. Glancing at contracts of special interest he was glad to say that entire satisfaction had been given by the electric locomotives now in regular operation in the Pyrenees service of the Midi Railway of France.

After a prolonged inquiry the Japanese Government Railways had decided to adopt the high-tension direct-current system, and had placed with the English Electric Company an order for thirty-four electric locomotives, the largest order of the kind ever executed entirely by British manufacturers. More recently the contract had been secured from the Great Indian Peninsula Railway for electrical equipments for the suburban lines in and near Bombay.

Foreign Trade Is Returning to Pre-War Condition

The volume of export trade in many commodities used in large quantities by electric railways decreased to a marked extent in 1922. This is shown by the recently published report of the U. S. Chamber of Commerce. Coal, coke, etc., at the head of the list, with 31,161,384,000 lb., was nevertheless 21.4 per cent below the pre-war average and 44.6 per cent below the figures for 1921. Steel rails with 625,166,000 lb. were 29.5 per cent below pre-war, and 13.3 per cent below 1921. Copper, on the other hand, with 652,667,000 lb. was 11.8 below pre-war figures but showed an increased export of 9.5 per cent over the preceding year. The export of hydraulic cement was heavily curtailed as the total quantity 424,070,000 lb. was 59.3 per cent less than the pre-war quantity and 4.5 per cent below 1921. In spite of the fact that coal occupies first place by weight in the list of exports, it does not play so prominent a part when value is considered, being seventh at $95,630,000, or 2.5 per cent of the total. Copper is ninth at $89,030,000. The decline in value of the coal exported coincided almost exactly with the reduction in quantity noted in the preceding paragraph, but the export of copper increased 19 per cent in value.

Electrical apparatus was an important part of the export trade. Telephone, telegraph and signal devices had a value of $3,398,000 last year. Electric motors, controllers, etc., exported were valued at $7,444,000. Switches, meters and other transmission and distribution apparatus had a $6,911,000 valuation, and transforming and converting devices were valued at $6,273,000.

The relative rank of foreign customers showed little change in 1922 from the year before. Great Britain, Canada, and Germany head the list in the order named. France is now fourth, having displaced Japan. South America continues to make a poor showing, with only 5.9 per cent of the total exports being consigned there.

Increased imports of such commodities as coal and hydraulic cement coincide with the decreased export, with the influence of the coal strike plainly discernable in the first case. The total imports for the year show an increase of 24 per cent over 1921 as compared with a decrease of 14.6 per cent in exports. The present trend appears from this to be toward a smaller export balance as in pre-war days.

Detroit May Purchase Generating Equipment

Although the Detroit City Council, which recently voted to award contracts for four 20,000-kw. turbo-generators, has rescinded this action, it is said to be likely that the city will eventually buy two, or possibly three, turbines to generate the 35,000 kw. or 40,000 kw. additional energy that it needs for lighting and pumping purposes and in the operation of the municipal railway. At present the city is generating about 19,000 kw. for these purposes and purchasing the rest from the Detroit Edison Company. It is the plan of the city administration eventually to generate all the power needed for municipal uses, but not to compete with the central-station company in the supply of private customers.

Employment and Wages Gain in April

A preliminary report of the Bureau of Labor Statistics of the U. S. Department of Labor covering over 5,000 representative industrial establishments shows in April an increase over March of 0.5 per cent in the number of employees, an increase of 1.4 per cent in the total amount paid in wages, and an

ELECTRIC RAILWAY MATERIAL PRICES—MAY 31, 1923

Metals—New York

Copper, electrolytic, cents per lb.	14.75
Lead, cents per lb.	7.25
Nickel, cents per lb.	28.50
Zinc, cents per lb.	6.70
Tin Straits, cents per lb.	42.25
Aluminum, 98 to 99 per cent, cents per lb.	27.25
Babbitt metal, warehouse, cents per lb.:	
Fair grade	65.00
Commercial	40.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$6.25
Somerset mine run, Boston	3.175
Pittsburgh mine run, Pittsburgh	2.00
Franklin, Ill., screenings, Chicago	1.95
Central, Ill., screenings, Chicago	1.575
Kansas screenings, Kansas City	2.625

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.15
Tie plates (flat type), cents per lb.	2.675
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.375
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.50

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron (28 gage), cents per lb.	3.85
Sheet iron, galvanized (28 gage), cents per lb.	5.25
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	3.35

Waste—New York

Waste, wool, cents per lb.	12–16
Waste, cotton (100 lb. bale), cents per lb.:	
White	11–13.50
Colored	8–13

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$1.16
White lead (100 lb. keg), cents per lb.	13.125
Turpentine (bbl. lots), per gal.	$1.07
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4.75

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	18.375
Rubber-covered wire, No. 14, per 1,000 ft.	$7.75
Weatherproof wire base, cents per lb.	19.00

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq.yd.	$3.50
Common, per sq.yd.	3.10
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	3.19
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu.yd., N. Y.	2.25
Sand, cu.yd., N. Y.	1.25

Old Metals—New York

Heavy copper, cents per lb.	12.50
Light copper, cents per lb.	10.625
Heavy brass, cents per lb.	6.50
Zinc, old scrap, cents per lb.	4.375
Yellow brass, cents per lb. (heavy)	6.50
Lead, heavy, cents per lb.	6.00
Steel car axles, Chicago, net ton	$21.75
Old car wheels, Chicago, gross ton	22.75
Rails (short), Chicago, gross ton	22.25
Rails, (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	17.75

increase of 0.9 per cent in the average weekly earnings. Identical establishments report 2,139,053 persons employed in April compared with 2,128,816 in March, and weekly payrolls of $55,353,000 compared with $54,573,958.

Rolling Stock

Beech Grove Traction Company, Beech Grove, Ind., has placed an order with the Cincinnati Car Company for two one-man Birney safety cars. The order was placed in April, and delivery is expected in July. The seating capacity of the car is thirty-two persons.

Columbia Railway, Gas & Electric Company, Columbia, S. C. placed an order with the J. G. Brill Company of Philadelphia for six one-man cars of the standard Birney safety type. Additional equipment of this type is contemplated, but no orders have been placed.

Memphis Street Railway, as was reported in the ELECTRIC RAILWAY JOURNAL, issue of May 12, has placed an order for forty new cars. They are described as follows:

Date order was placed	May 18, 1923
Date of delivery	December, 1923
Builder of car body	St. Louis Car Company
Type of car	Low-level, light-weight passenger
Seating capacity	48
Total weight	33,400 lb.
Bolster centers, length	22 ft. 0 in.
Length over all	45 ft. 2 in.
Truck wheelbase	5 ft. 10 in.
Width over all	8 ft. 4½ in.
Body	Steel
Interior trim	Birch
Headlining	Agasote
Roof, arch or monitor	Arch
Air brakes	General Electric C. P. 27
Control	K-35
Couplers	Hoovey
Curtain fixtures	Curtain Supply Company
Designation signs	Hunter
Door-operating mechanism	Memphis Street Railway standard
Fare boxes	Johnson
Fenders or wheelguards	Memphis Street Railway standard
Gears and pinions	General Electric
Hand brakes	St. Louis Car Company
Heater equipment	Consolidated
Headlights	Golden Glow
Journal boxes	M. C. B.
Lightning arresters	General Electric
Motors, type and number	40-G. E.-265
Motors, outside or inside hung	Inside
Paint, varnish or enamel	St. Louis paint and surfacer
Registers	International No. 5
Sanders	St. Louis Car Company
Sash fixtures	Dayton Manufacturing Company
Seats	Hale & Kilburn
Seating material	Wood
Step treads	Feralun
Trolley catchers or retrievers	Ideal
Trolley base	U. S. No. 13
Trolley wheels or shoes	4 in. wheels
Trucks	Brill 76 E.
Ventilators	Nichols-Lintern
Wheels (type and size)	Cast iron, 26 in.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., in connection with its change from single-phase operation to d.c. operation has purchased the following equipment: Twelve new all steel passenger cars from the Cincinnati Car Company; forty-eight Westinghouse type 548-C-7 field control 105 hp. motors at 600 volts for the passenger cars; sixteen Westinghouse 557-A-7 field control 145 hp. motors for freight service; Westinghouse standard HLF pneumatically operated control to permit train operation. The gear ratio on the passenger cars will be 21/68 and Nuttall helical gears will be used. The gear ratio for the freight cars will be 16/61 and helical gears will also be used here.

Track and Roadway

Brantford Municipal Railway, Brantford, Ont., expects to build 1,000 ft. of new track on Oxford Street.

Chicago, Ottawa & Peoria Railway, Joliet, Ill., is replacing some 60-lb. rails in La Salle and Peru with 100-lb. A. R. A. rails.

Bristol & Plainville Electric Company, Bristol, Conn., expects to replace at once 1 mile of track for new paving. Supplies are all on hand.

United Electric Railways, Providence, R. I., has ordered the necessary material for its track work in connection with the loop plan to be put into effect in the early fall. Deliveries on the orders are expected in about two months.

Los Angeles Railway has applied for franchises to permit construction of track on Vermont, Evergreen, Melrose and Central Avenues, Rampart Boulevard, South Main, West Eighth and West Forty-eighth Streets.

Rochester & Syracuse Railroad will spend $75,000 this year making improvements to the right-of-way, T. C. Cherry, vice-president and general manager, has announced. A large part of the line will be reconstructed with 25,000 new ties and new ballast. The work is already under way near Lyons.

Johnstown, Pa.—A petition to grant the Johnstown Traction Company a franchise to operate cars on Ohio Street, from Moxham, Johnstown, to the borough of Lorain, has been filed with the Johnstown City Council. The petition is signed by residents of Lorain Borough, who want an extension. The franchise is being held for consideration by the Johnstown Council.

Power Houses, Shops and Buildings

Boston Elevated Railway has awarded to Simpson Brothers Corporation the contract for constructing the superstructure of four buildings constituting the first unit of the new shops at Everett, Mass.

Electric Depot Company, Cleveland, is completing a new warehouse which will be the largest building of its kind that the company owns. The freight traffic on the interurban roads surrounding Cleveland has been increasing greatly, particularly on the Northern Ohio line, and this line will be among those served by the warehouse. Its area will be approximately 160 ft. x 44 ft., and it is served by three tracks on one side and a driveway on the other.

Boston, Mass.—Plans for the enlargement of the sheltered area at the Everett terminal of the Boston Elevated Railway were submitted recently to the Public Utilities Commission. The plans call for the relocation of the waiting room in the station so that it will be placed on the easterly side of the terminal, between the outbound surface tracks and Broadway. The relocation will make possible an extension of the sheltered area 75 ft. long and 25 ft. wide. A prepayment entrance, at the corner of Broadway and Bowdoin Street, will also be installed.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., in connection with its change over to d.c. operation has placed orders with the Westinghouse Electric & Manufacturing Company for equipment for ten automatic substations. These will consist of five 300 kw. and three 500 kw. full automatic substations, and one 500 kw. semi-automatic substation. The 300 kw. automatics will be installed at Martin on the Cincinnati division and at New Bethel, Fairland, Prescott and Adams on the Shelbyville division. The 500 kw. automatics will be installed at Hoffman, Reedville and Gwynneville on the Cincinnati division. The one semi-automatic station will be located at Rushville, which is the location of the present power plant. Each of the automatic stations will be equipped with one 600 volt d.c. six phase 60 cycle compound wound rotary converter, one three-phase 33,000 volt transformer and automatic switching equipment. There will also be high tension switching equipment for sectionalizing, which will probably be of the out-door type. The tenth automatic equipment will be of 500 kw. capacity for installation on one of the present cars for use as a portable substation.

Trade Notes

General Electric Company will move its Omaha offices from the Electric Building to the City National Bank Building.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces that C. H. Long, formerly manager of the contract section of the railway department, has been appointed a section manager of the light traction division of the railway department and is responsible for international negotiations and also for stocks and production schedules of the light traction division. R. W. Soady has been appointed manager of the contract section to succeed Mr. Long.

T. M. Grindley Company is the new name of the organization handling the sale of the products of the Conveyors Corporation of America, Chicago, in the Province of British Columbia. The address of the Grindley Company is 1158 Homer Street, Vancouver. The Grindley Company was the western office of Gormans Limited, Edmonton, and operated under that name up to May 1, but after that date Mr. Grindley took over the business, organized his own company and enlarged his selling staff.

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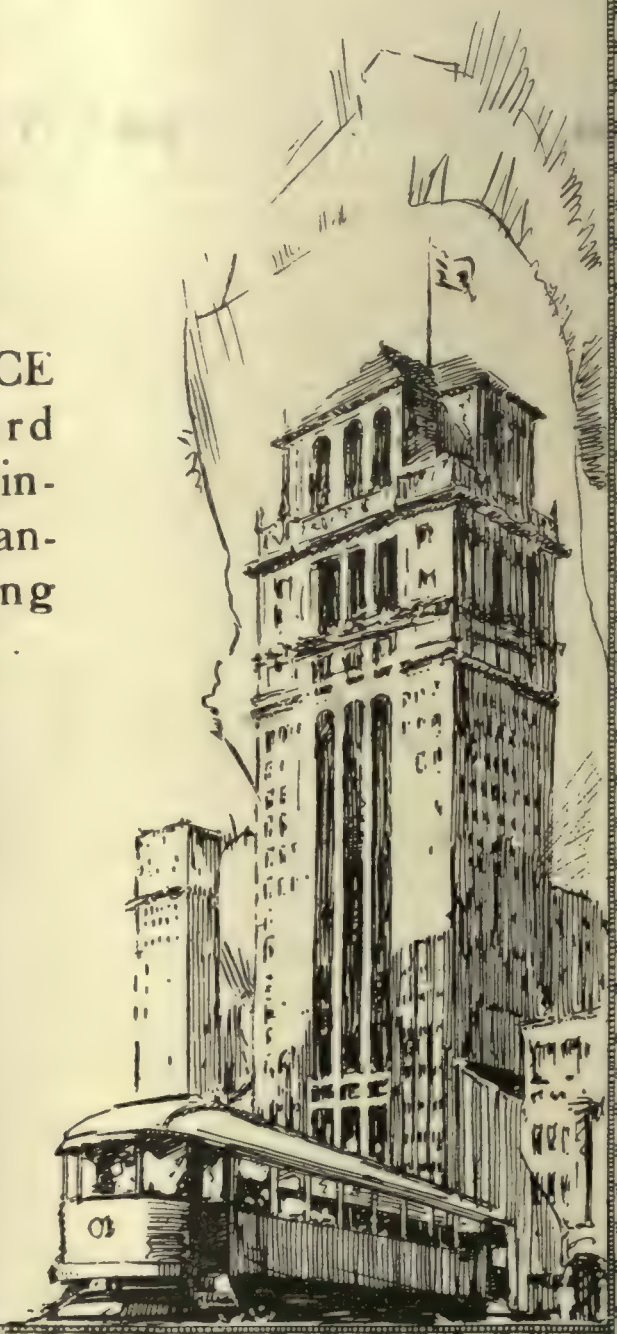
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Irv-O-Slot for core insulation saves the armature winder's time because it enables him to put both fibre and varnished cambric into the slot at one operation.

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"The welding we did on switches and mates is holding up very well; in fact we have no cause for complaint on any of the Thermit welding we have done." (This same Engineer reports having experienced some very sudden temperature changes last winter which caused a lot of broken rails and joints on his system, but none occured on the section which was Thermit welded last summer.)

From Maine:

"I am deeply interested in Thermit rail welding. We have installed a number of Thermit welded compromise joints, and I find them so satisfactory that I am desirous this coming season, provided I can obtain an authorization, to install at least a short stretch of track with all joints Thermit welded."

Another from Illinois:

"We have had some trouble with the rail breaking at the fillet connecting the web with the rail head in the rail in our Lorain Section 95-400 and our Lorain Section 91-375. We found this condition prevailed where the rail has cast welded joints and also where angle bars were used. This failure usually went along under the head of the rail and to the first or second bolt hole. These rails have been in service for about fifteen years. Where we used Thermit joints we have experienced no trouble."

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PITTSBURGH CHICAGO BOSTON S. SAN FRANCISCO TORONTO

Report of Investigation of

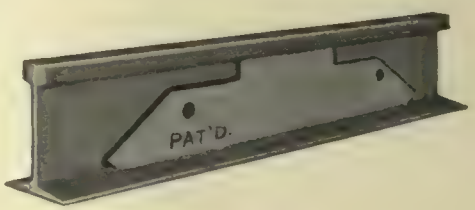
"INDIANAPOLIS"

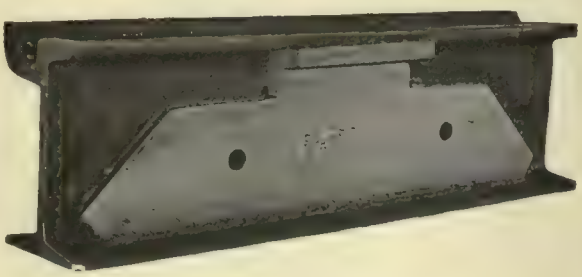
Type of Welded Rail Joints

They Meet All Requirements

To Wit as Follows:

1. **Conductivity**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100% — Robert W. Hunt & Co., Testing Laboratories.
3. **Endurance**—11 years in Service—Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity — from One (1) to Ten Thousand (10,000).
7. **Universal**—In use on over 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 properties.





WHY?

Because —

They are Scientifically Designed
A Special Product for a
Specific Purpose

Completely and Perfectly Effecting the
"CONTINUOUS RAIL"

"Perfection in Principle Proven in Performance"

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

J. J. Costello Boston, Mass. New England Representative

Splitproof
Shrinkproof



Pittsburgh Cars
Lined with
Haskelite



Pittsburgh Folk Will Like These Car Interiors

(THE LINING IS HASKELITE)

The above photographs illustrate one of forty cars built recently by the Pressed Steel Car Company with HASKELITE upper deck linings. Seventy-five similar cars are being constructed with complete HASKELITE linings by the St. Louis Car Co.

Not only do the Pittsburgh Railways specify HASKELITE in their new equipment, but also use it almost exclusively in their repair shops.

Because of their hard, smooth surface, HASKELITE linings are easily brought to a finish of automobile brilliance. For ease of application there is no material that equals HASKELITE — for either headlining, roofs and bulkheads. Built for airplane use, HASKELITE has astonishing strength with light weight.

PLYMETL, a smaller product, is used for wainscoting and vestibule linings. The Indianapolis St. Railways have reported complete satisfaction with a large installation of PLYMETL vestibule linings.

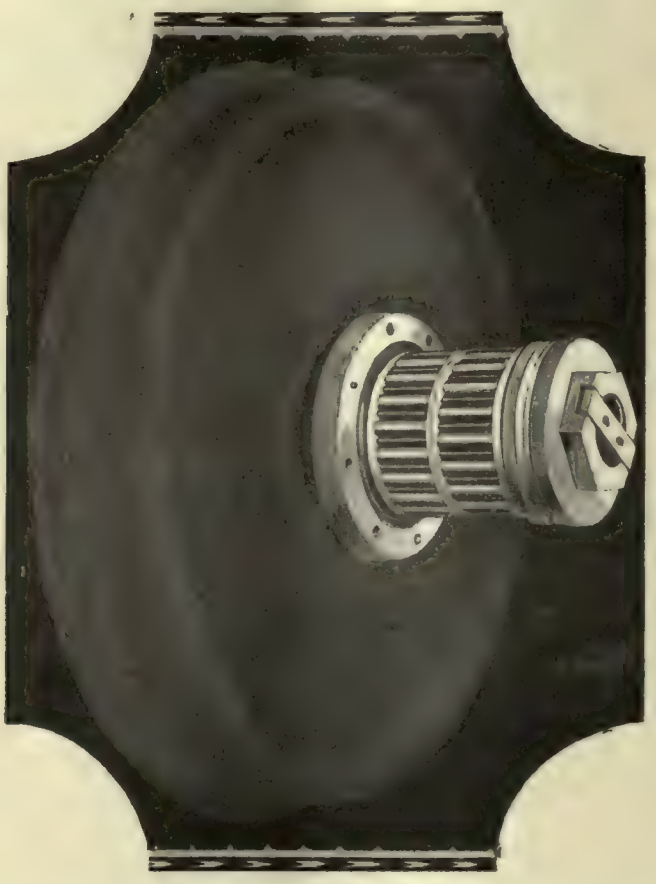
You should have samples of HASKELITE and PLYMETL.

A valuable set of blue prints dealing with headlining and roof construction will be sent free on request.

Haskelite Manufacturing Corporation

133 W. Washington Street
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STAGGERING



Staggering makes it possible for the Stafford Roller Bearing for Car Trucks to reduce journal friction 90% and to easily carry the heaviest bearing loads for years under severest conditions.

The Stafford Roller Bearing has a double row of staggered rollers. This exclusive—and revolutionary—feature of design prevents the weight of the car from being constantly lowered and raised as each roller approaches and passes the crown of the journal, as is the case with ordinary roller bearings.

Let us show you the Stafford Roller Bearing so you can prove the truth of this statement yourself.

Stafford—guaranteed three years

STAFFORD ROLLER BEARING CAR TRUCK CORPORATION

LAWTON MICHIGAN

"IT ROLLS THE FRICTION AWAY"



ELEVATED TRAINS NOW IN NEW DRESS

"Goldenrod Special" Introduces Color Scheme With I. R. T. Officers Aboard.

HAS PASSENGERS' APPROVAL

Three Newly Painted Trains to Be Commissioned Each Week—Cost, With Stations, $2,000,000.

The 'Goldenrod Special,' the first of the Interborough Rapid Transit Company's elevated trains to be decorated in the new orange and black color scheme, made its appearance yesterday on the Sixth Avenue line. The train, which consisted of eight cars left the Rector Street station at 11:56 A. M and proceeded to the end of the line at West 155th Street, after which it continued on a regular schedule all day.

Announcement of the decorative scheme had been made in advance in the newspapers, and regular elevated railroad passengers, who were on the watch for it, seemed to regard its vivid coloring

Clipping from the New York Times, April 24, 1923.



Have Faith in Paint!

Why does the management of New York's Elevated lines appropriate $2,000,000 to "dress up" its cars in fresh, bright paint? Did you ever ask why the taxi people adorn their cabs in vivid hues—and keep them freshly painted all the while? Have you ever noticed how a United Cigar Store with its characteristic glowing red signs attracts your attention?

Paint attracts attention—and by attracting attention paint draws patronage. Paint will help to sell transportation.

Better business begins with better paint

BECKWITH-CHANDLER

offers expert service together with highest quality paints and varnishes.

Users of Beckwith-Chandler car finishes include many of the leading steam and electric railways of America. Companies in the three largest cities, New York, Chicago and Philadelphia are among our best customers. Both quality and price must be right to keep these customers.

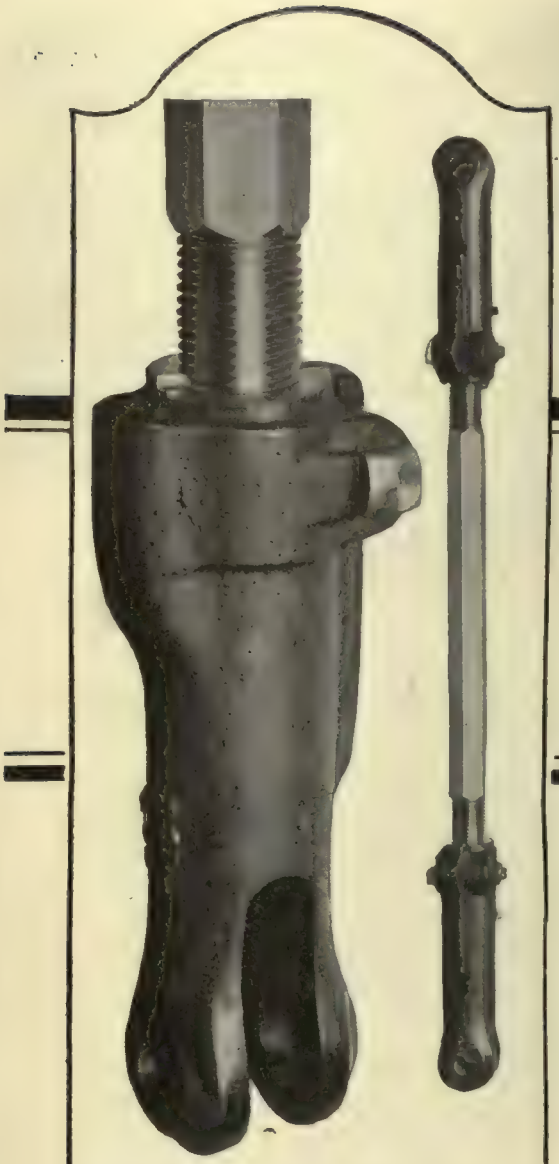
Our wide experience among such a clientele, enables us to furnish expert advice on the proper use of car finishes to "sell transportation" and still obtain durability and economy.

Write for further information.

The Beckwith-Chandler Company

193-211 Emmett St., Newark, N. J.

320 Fifth Ave., New York



Better Because It's Boyerized

The McArthur Turnbuckle

You won't have to re-fit the brake rigging with new turnbuckles, if you specify McArthur Turnbuckles in the first place. They will last as long as the truck itself.

More than that—the old style jam-nut idea has been scrapped, and an efficient spring-equipped split-clamp principle has been substituted. Now it only takes a pocket-wrench and a moment's time to make an adjustment, and tighten it up *to stay*.

Send for Sample to try.



The ninth inning need not be the end of the game!

Patrons of the National sport like to see the game tied in the ninth—they get more for their money.

Boyerized Parts give you extra innings also,—many of them in fact,—for they wear from three to four times as long as ordinary untreated steel.

The Long-Life List They are BOYERIZED Parts

Brake Pins	Spring Posts
Brake Hangers	Bolster and Transom Chafing Plates
Brake Levers	McArthur Turnbuckles
Pedestal Gibs	Manganese Brake Heads
Brake Fulcrums	Manganese Truck Parts
Center Bearings	Bushings
Side Bearings	Bronze Bearings
Spring Post Bushings	

Boyerized Parts cost slightly more because they last three or four times as long as parts of ordinary untreated steel. Let us quote you on your requirements.

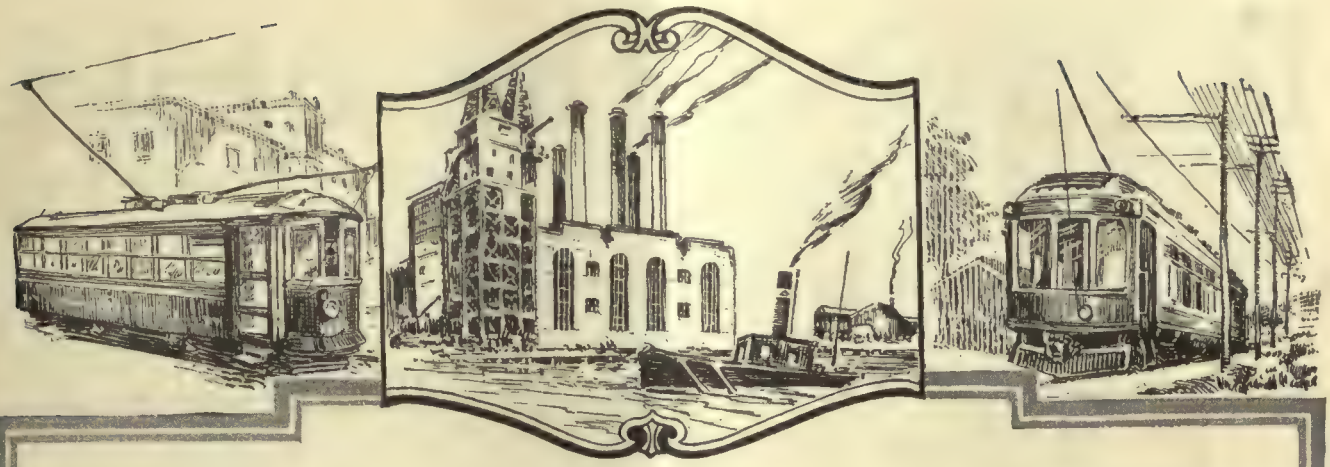
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Electric Railway Supplies

SPRINGFIELD, MASS.

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"Like a Motorman's Glove!"

No need to tell you men why that phrase exists—
or what condition it implies.

BUT while a motorman's glove cannot be expected to remain as immaculate as that of the doorman at the Ritz-Carlton, there's no need for that glove to be full of oil.

No need because when the motorman's valve is lubricated with Texaco Transmission Lubricant, there won't be any oil on the glove.

—For this lubricant does not creep up the stem.

The cleanliness in this ONE place is only an indication of the value of Texaco Transmission Lubricant when used in other places on the cars.

For instance, when used on:

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Controller Fingers

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this excellent Lubricant does its work—does it well—lubricating efficiently without creeping, dripping or spattering.

Texaco Transmission Lubricant does not form any undesirable deposits.

We repeat: It is a well made, clean effective lubricant.

Let us tell you more about this Texaco product. Let us tell you why it is being adopted by more and more lines throughout the country.

Many of these lines are buying it, in addition to their barrel orders, in the handy 5-lb. screw top can, which is clean and convenient and ready for instant use in the barns or shops.



Electric Street Railway men like it because ONE lubricant, Texaco Transmission Lubricant, is so efficient for so many purposes. It avoids waste and mistakes.

There Is A Texaco Lubricant For Every Purpose

and they are unexcelled for the Lubrication of Street Railways, on Rolling Stock, in Power Plant or Shop.

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Some satisfaction, that!

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Don't experiment—use the Life Guard which has a long life-saving record and of sound construction—economical to maintain, as manufactured by

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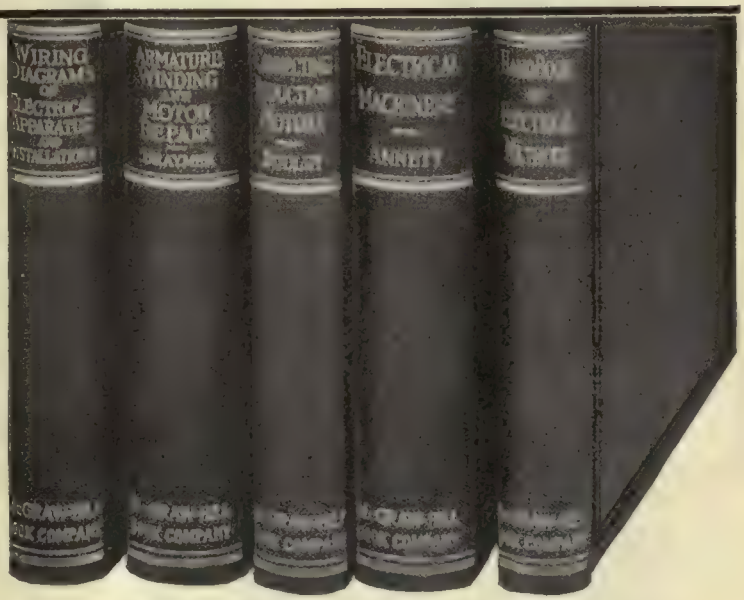
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THIS library contains the largest collection of practical methods for electrical repair and maintenance men that has ever been put together in book form.

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The man who is equipped with these five practical books will have a most valuable asset—one that will enable him to step ahead in his work more rapidly than most electrical workers.

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3. They show you how to reconnect motors to meet any condition of voltage, phase, frequency and speed.
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THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

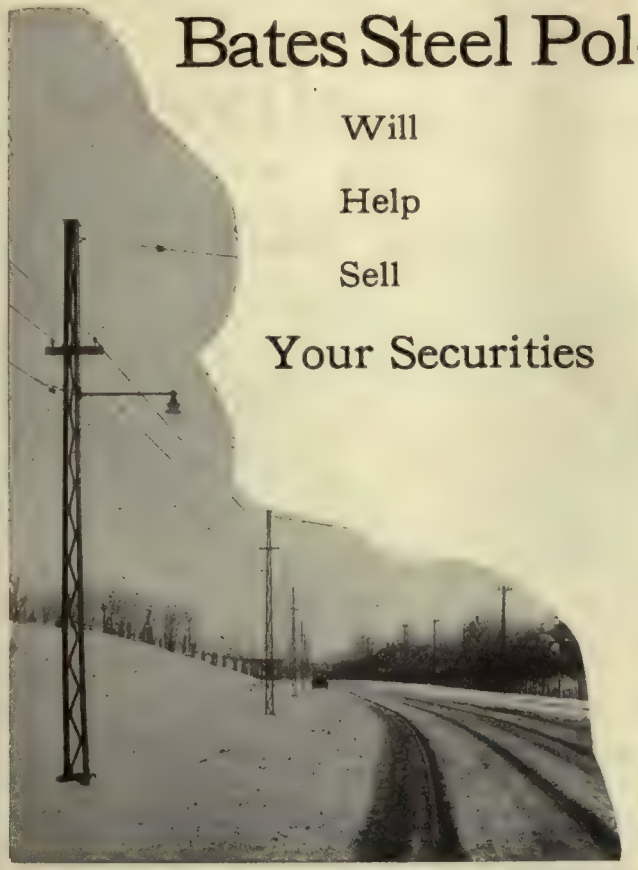
Chicago, 4	Sayre, Pa.
St. Louis, 2	Berwick, Pa.
Buffalo, 4	Albany
Pittsburgh, 2	Toronto
Cleveland, 2	New Glasgow, N. S.
Amherst, N. S.	Madison, Ill.
Montreal	Huntington, W. Va.
Mich. City, Ind.	Wilmington, Del.
Louisville	Houston, Tex.
Mt. Vernon, Ill.	Hannibal, Mo.
Ft. Wayne, Ind.	Reading, Pa.
Birmingham	Baltimore
Atlanta	Richmond, Va.
Savannah	Ft. William, Ont.
Boston	St. Thomas
Detroit	Hamilton
St. Paul	Ramapo, N. Y.
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700 lb. wheel for 80,000 Capacity Cars
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The Standard Wheel for Seventy-Two Years

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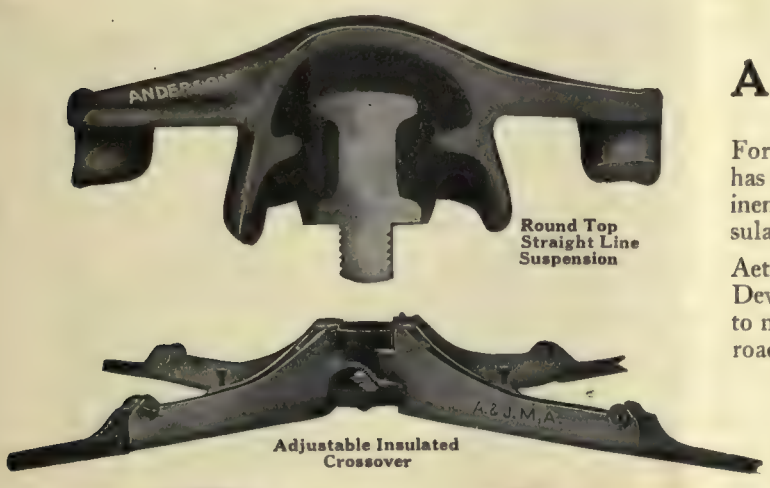
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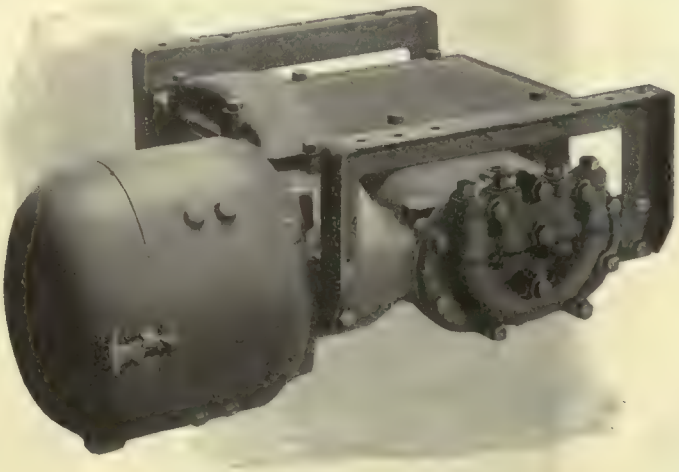
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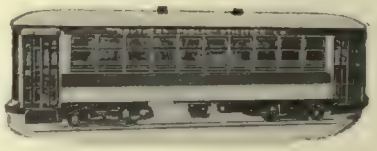
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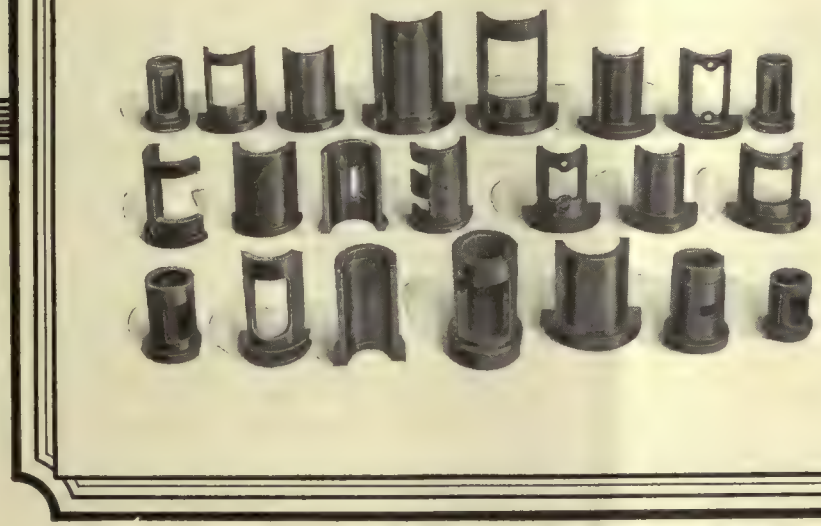
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—then they ordered twenty-five (25) more!

St. Louis Quality Cars



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CREOSOTERS

Washington Court House, Ohio

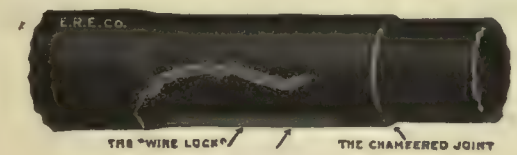
Cross Ties — Bridge Timbers
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Treated and Untreated

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On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

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COMBINE

Lowest Cost — **Lightest Weight**
Least Maintenance — **Greatest Adaptability**

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Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

Chapman Automatic Signals

Charles N. Wood Co., Boston





Ramapo Iron Works Established 1831 — **Ajax Forge Company** Established 1883

RAMAPO AJAX CORPORATION

Successor

HILLBURN, NEW YORK

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Automatic Return Switch Stands for Passing Sidings
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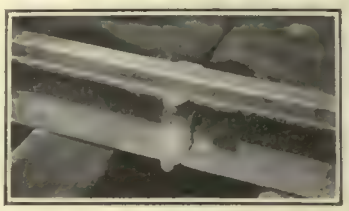
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Your best insurance against insulator breakage

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An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.



Feralite Welded Joint

Special advantages — (1) Rail ends are butted together and easily aligned, no inserts needed to fill in or adjust. (2) Smaller portions of material used. (3) Grinding reduced to the minimum, only a slight touching up is needed.

The Feralite Rail Welding Process eliminates rail joints at a lower cost than any other process. Write for full details.

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Standard—Insulated—and Compromise Rail Joints

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Established 1858

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Frogs, Crossings, Switches and Mates
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Electrically Welded Joints

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WHARTON
Special Trackwork
For Street and Steam Railways

Steel Castings **Gas Cylinders**
ORIGINATORS OF
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
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HARD CENTER AND MANGANESE CONSTRUCTION

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An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.



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Series Type
Arc Welding and Bonding Outfit

Rugged series resistance coil
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Normal welding current at half voltage

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THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

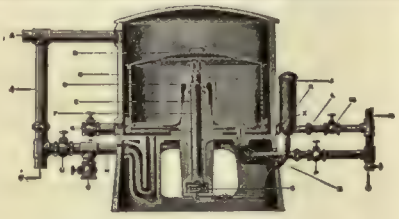
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Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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Save Money By Reclaiming It!

This oil extracting machine is reclaiming hundreds of gallons of perfectly good lubricating oil and many pounds of waste for the Milwaukee Electric Railway & Light Co. as well as many other companies. It will do the same for you. It is widely used as a real economy producing equipment.

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Service and economy are direct results of the proper application of

DIXON'S
Silica-Graphite Paint

Because of its pigment, flake silica-graphite it is able to successfully withstand deterioration agents.

Write for long service records and Booklet No. 180B.

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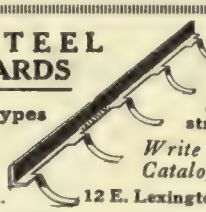
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Established 1827

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Adapted to all types of rails and paving.



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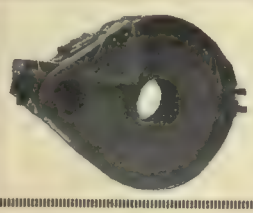
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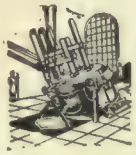


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One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

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MAKE YOUR OWN STEEL AND IRON CASTINGS WHEN AND AS YOU NEED THEM

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Largest Maker of Arc Furnaces in the World
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A Single Segment or a Complete Commutator

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

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The precise and delicate requirements of manufacturers of dynamos, magnetos and other electrical apparatus prescribe the use of electric tape that is known to be of constant high quality.

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Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Far East. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

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High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

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High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

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For Electric Railways

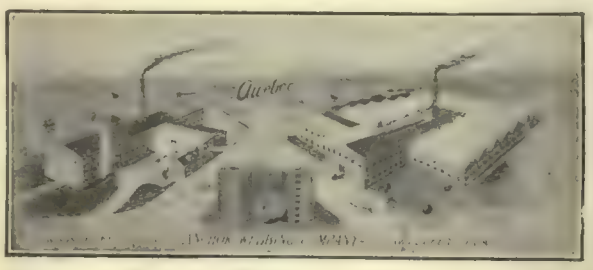
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Inspecting Engineers and Chemists

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Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

ANCHOR WEBBING COMPANY
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We make a specialty of

ELECTRIC RAILWAY LUBRICATION

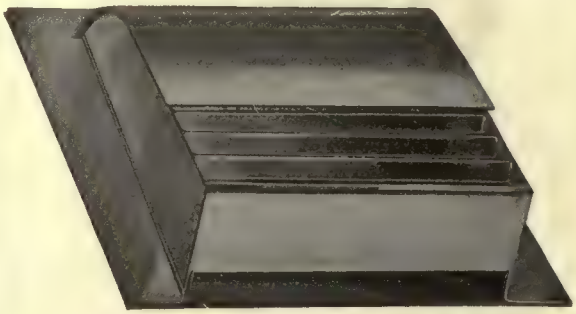
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Cleveland, Ohio

Safety cars
make
safer dividends
when equipped with
"Tool Steel" gears & pinions

**The Tool Steel
Gear and Pinion Co.**
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N-L Products manufactured and sold in Canada by
**Railway and Power Engineering Corporation, Ltd.,
133 Eastern Avenue, Toronto, Ontario**

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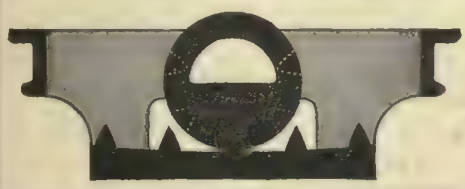
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Use them in your Prepayment Areas and Street Cars
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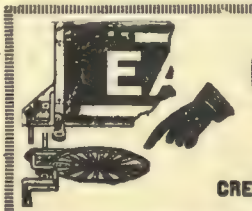
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BEARINGS**
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100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
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in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago



See the Crank of the
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By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.
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We have given more than a quarter of a century to the study of fare collection problems and to designing mechanical methods for proper registration.

Thousands of International Registers designed and manufactured over twenty years ago are still in use and are today giving good service.

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It is not therefore, due to chance that the majority of the City Systems in the United States are today using International Registers but the very proof of the excellent design, the superior quality of materials used and the care and skill with which they are produced.

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Selling electric railway transportation according to correct business methods requires the indication and registration of the exact amount of each sale.

OHMER FARE REGISTERS indicate and register each transportation sale. They are made in many types and sizes adapted to electric railways, motorbuses and taxicabs.

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HIGH SPEED MONEY CHANGERS

1923 model —without rivets— ready for delivery



Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

Prices and Literature sent on request

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Exclusive Manufacturer's Selling Agent



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The fewness of working parts of

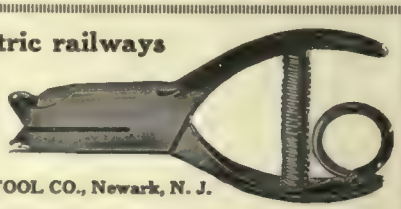
Cleveland Fare Boxes

together with selected materials and careful manufacture, practically eliminate fare box failures.

The Cleveland Fare Box Co.
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PRESTON, ONT.

75% of the electric railways use

B-V Punches



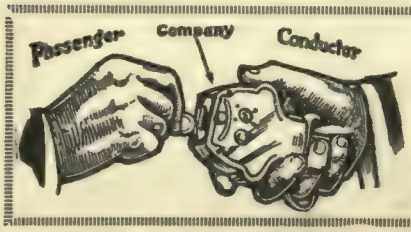
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Car Heating and Ventilation

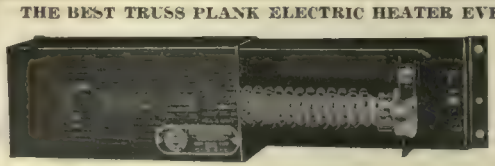
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. **Write for details.**

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Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



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POSITIONS VACANT

MASTER mechanic wanted to supervise shop for property operating 40 cars. State age, experience and give references in first reply. Also whether married or single. P-561, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of electrical equipment wanted for small interurban road, in Pennsylvania. Salary $200.00 per month. Address to P-558, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

WORKING shop foreman wanted, familiar with brakes, car wiring and controllers. State age, experience, references and salary expected in first letter. P-554, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ACCOUNTING executive, thoroughly experienced in all branches of large properties: street railway, light, power and gas utility, open for engagement. Capable of assuming full control of all accounting work. PW-543, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

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SUPERINTENDENT of transportation with a successful record of 19 years on large properties, desires a change, and solicits correspondence with managers that are in need of a capable, progressive superintendent who knows how to get results and has a record as an economical operator. At present with large property. Personal reasons for making a change. High grade references as to character and ability. PW-559, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

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Individual or firm, to sell dust guards for journal boxes, to railway companies. Address International Railway Specialties, 43 Drexel Building, Philadelphia, Pa.

Armature Coils—Field Coils and Commutators

for 49B-38B and 12A Railway Motors for sale at practically scrap price.

NEW BRUNSWICK POWER CO.,
St. John, N. B.

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One Electric Railway Improvement Co.'s

Rail Bonding Car

This car is in good workable condition. Inquiries to be made of Purchasing Department.

San Diego Electric Railway Co.,
San Diego, Calif.

ROTARY CONVERTER

1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

18 K 34

CONTROLLERS

TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York, N. Y.

25-cy. Motors, Transformers, Motor Generator Sets

Over 1200-25 cycle motors, three-phase, totalling 15,000 hp. in sizes from 1 to 750 hp., various speeds.

Single- and three-phase 25 cycle transformers, from 1 to 200 kw. Frequency Changer Sets 25 to 60 cycle.

1— 500 kva. G. E. ..... $ 6,300
2—1250 kva. Westinghouse 11,800

Prices quoted F. O. B. cars Kansas City, Mo.

All 6600 volt on 25 cycle end and 4150 volt or can be reconnected 2400 volt on the 60 cycle end.

Prices subject to change without notice and subject to prior sale. Many items almost new and all were in operating condition when removed from service.

This equipment on hand due to a recent change from 25 to 60 cycle distribution.

For details and prices, address

Kansas City Power & Light Company, Kansas City, Mo.

Attention: W. C. BLAIR, Industrial Engineer

Power Station to be Dismantled

Entire equipment offered for immediate sale, as and where is, to be moved in 60 days.

BOILERS

3—215 hp. Babcock & Wilcox, 140 lbs. allowed pressure, 108—4-in. x 18-ft. tubes, 7-ft. x 7-ft. 6-in. Reagan Grates.
1—250 hp. Babcock & Wilcox, 137 lbs. allowed pressure, 126—4-in. x 18-ft. tubes, 7-ft. x 8-ft. 6-in. Reagan Grates.
1—250 hp. Cahall, 160 lbs. allowed pressure, 126—4-in. x 18-ft. tubes, 6-ft. x 8-ft. 6-in. Reagan Grates.

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2—500 hp. Green-Tandem Compound Engines, 17-in. x 33-in. x 48-in., 104 r.p.m., Driving Wheels 16-ft. dia. x 49-in. face. Belted to—
2—500 kw., General Electric Generators, 550 V. D.C., 350 r.p.m., 4 Pole.
1—1800 hp. Cooper-Corliss-Cross Compound Engine, 28-in. x 60-in. x 60-in., 80 r.p.m., Fly Wheel 18-ft. dia., weight 60 tons. Direct coupled to—
1—1200 kw., General Electric Generator, 575 V. D. C., 16 Poles.

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1—Blake Double Air Pump and Jet, 14-in. x 35-in. x 21-in.
2—Deane Double Air Pumps and Jets, 21-in. x 16-in. x 18-in.

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1—Platt Duplex, 10-in. x 6-in. x 12-in.
1—Worthington Duplex, 7½-in. x 4½-in. x 6-in.
1—Goulds Triplex, 6-in. x 10-in.

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1—Wainwright Tubular, 102—1½-in. x 84-in. Tubes.
1—Wainwright Coil, No. 3, 1000 hp.
1—National Coil, No. 16, 1500 hp.

MISCELLANEOUS EQUIPMENT

Air Pump
Oil Pumps
Centrifugal Pump
Damper Regulator
Oil Filters
Pipe, Valves and Fittings
Switchboard and Fittings
Wire and Cables.

Address, Purchasing Department

EASTERN MASSACHUSETTS STREET RAILWAY COMPANY
No. 1 Beacon Street, BOSTON, MASS.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stand
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Autos & Buses
White Co., The
Axles
St. Louis Car Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitt Metal
More-Jones B. & M. Co.
Babbitting Devices
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International Register Co., The
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Columbia M. W. & M. I. Co.
General Electric Co.
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Le Grand, Inc., Nic.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Bearings, Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Co.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Benders, Rail
Ry. Track-work Co.
Boilers
Babcock & Wilcox Co., The
Boiler Tubes
National Tube Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Imp. Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work
Bonds, Rail
Amer. Steel & Wire Co.
Elec. Railway Imp. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.
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Bates Exp. Steel Truss Co.
Creaghead Eng. Co.
Elec. Ry. Equip. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
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Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
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Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.
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Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
Bridges & Buildings
American Bridge Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.
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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings
Nat'l Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
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Hale & Kilburn Corp.
Heywood-Wakefield Co.
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(See Wires and Cables)
Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.
Carbon Brushes
(See Brushes, Carbon)
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Elec. Service Supplies
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
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Differential Steel Car Co., Inc.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight Express, etc.
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Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
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St. Louis Car Co.
Thomas Car Works
Perley A.
Wason Mfg. Co.
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Electric Equipment Co.
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General Electric Co.
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Wharton, Jr. & Co., Inc., Wm.
Castings, Gray Iron and Steel
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Columbia M. W. & M. I. Co.
Wharton, Jr., & Co., Inc., Wm.
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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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Ohio Brass Co.
Wood Co., Chas. N.
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Archbold-Brady Co.
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Haskelite Mfg. Corp.
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Cleveland Fare Box Co.
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WestinghouseElec . & M. Co.
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Ohio Brass Co.
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General Electric Co.
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Coil Banding and Winding Machines
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Electric Service Sup. Co.
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Columbia M. W. & M. I. Co.
General Electric Co.
Rome Wire Co.
Westinghouse Elec. & M. Co.
Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The
Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.
Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.
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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
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General Electric Co.
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General Electric Co.
Westinghouse Elec. & M. Co.
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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
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Ingersoll-Rand Co.
Compressors, Gas
Ingersoll-Rand Co.
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General Electric Co.
Ingersoll Rand Co.
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Irvington Varnish & Ins. Co.
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Std. Underground Cable Co.
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Consolidated Car Heating Co.
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General Electric Co.
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Cord Connectors and Couplers
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Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
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Crossing Foundations
International Steel Tie Co.
Crossing Frogs and Switches
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Wharton, Jr., & Co.,Inc.,Wm.
Crossings, Manganese
Indianapolis Switch & Frog Co.
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Crossings, Track, (See Track, Special Work)
Crossings, Trolley
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Brill Co., The J. G.
Edward Co. Inc., The O. M.
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Morton Mfg. Co.
Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co.
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
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Creaghead Eng. Co.
Electric Service Supplies Co.
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Wish Service, P. Edward
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Edwards & Co., Inc., The O. M.
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Hale & Kilburn Corp.
Safety Car Devices Co.
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National Pneumatic Co., Inc.
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Ingersoll-Rand Co.
Drills, Track
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Electric Service Supplies Co.
Ingersoll-Rand Co.
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Electric Service Supplies Co.
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Railway Track-work Co.
Electrodes, Carbon
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Railway Track-work Co.
Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track-work Co.
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Nat'l Vulcanized Fibre Co.
Westinghouse Elec. & M. Co.
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Flangeway Guards
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Frogs, Trolley
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Railway Track-work Co.
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Guard Rails, Tee Rail & Manganese
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Guards, Trolley
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Ingersoll-Rand Co.
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General Electric Co.
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Smith Heater Co., Peter
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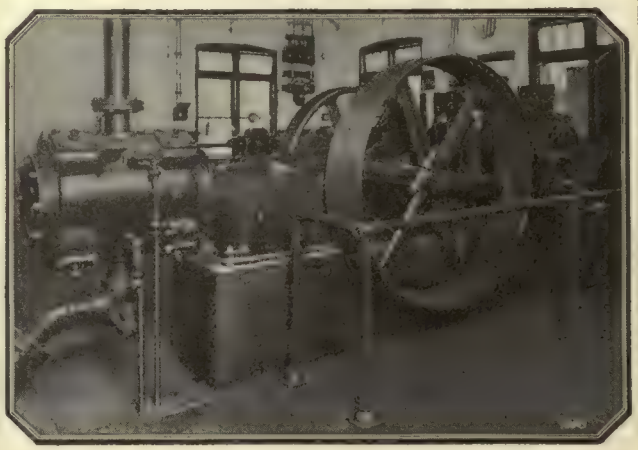
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Heywood-Wakefield Co.
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Ohio Brass Co.
Westinghouse Tr. Br. Co.

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National Tube Co.

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Westinghouse Tr. Br. Co.

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Ohio Brass Co.

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Drew Elec. & Mfg. Co.
Hubbard & Co.

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Page & Hill Co.

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Lapp Insulator Co.

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Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N.

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Ramapo Ajax Corp.

Rail Joints
Carnegie Steel Co.

Rail Joints, Welded
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.

Rail Grinders (See Grinders)

Railway Paving Guards Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
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Westinghouse Elec. & M. Co.

Rail Welding (See Welding Processes)
Metal & Thermit Corp.
Ry. Track-work Co.

Rattan
Brill Co., The J. G.
Electric Service Sup. Co.

Hale & Kilburn Corp.
Heywood-Wakefield Co.
McGuire Cummings Mfg. Co.
St. Louis Car Co.

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Oil & Waste Saving Machine Co.

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Electric Service Sup. Co.
International Reg. Co., The
Ohmer Fare Register Co.
Rooke Automatic Reg. Co.

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Carnegie Steel Co.

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Electric Service Sup. Co.

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General Electric Co.
Westinghouse Elec. & M. Co.

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Electric Service Sup. Co.

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Westinghouse Elec. & M. Co.

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Consolidated Car Heating Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

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Westinghouse Elec. & M. Co.

Roofs
Haskelite Mfg. Corp.

Roller Bearings
Stafford Roller Bearing Car Truck Co.

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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Balances
Edwards & Co., Inc., The O. M.

Sash Fixtures, Car
Brill Co., The J. G.
Edwards & Co., Inc., The O. M.

Sash, Metal, Car Window
Edwards & Co., Inc., The O. M.
Hale & Kilburn Corp.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Sup. Co.

Seating Materials
Brill Co., The J. G.

Seats, Bus
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Hale & Kilburn Corp.
Heywood-Wakefield Corp.
St. Louis Car Co.

Second-Hand Equipment
Electric Equipment Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
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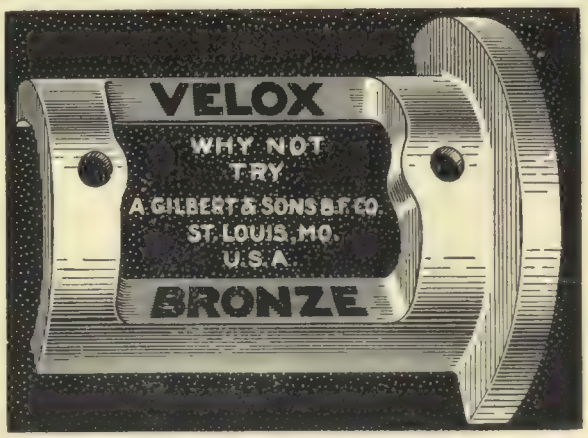
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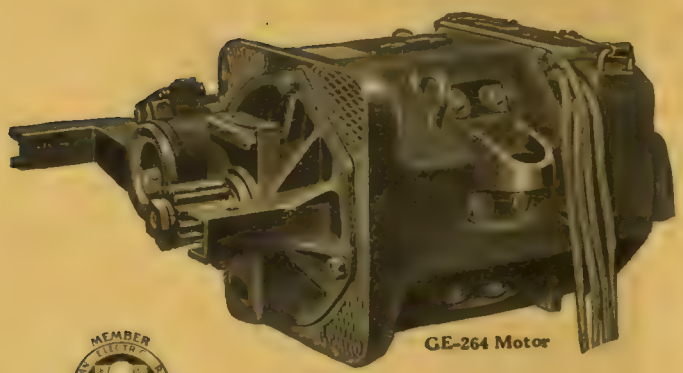
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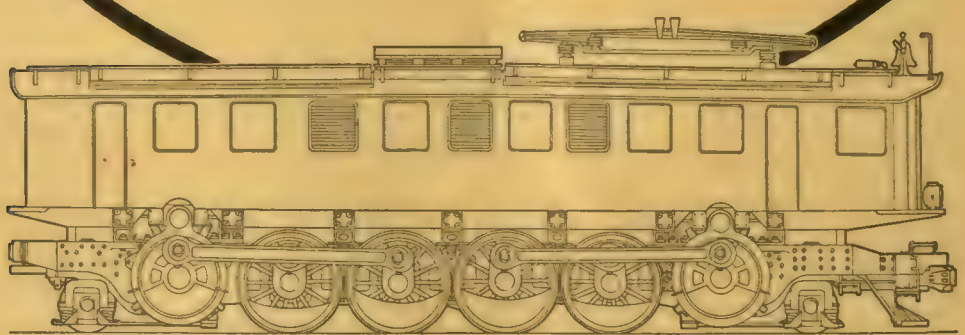
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Around the World in Good Company

TRAVEL with us over our subscription list and meet other friends of ELECTRIC RAILWAY JOURNAL. We'll first visit subscribers all over the United States and its possessions. In Canada, of course. On to Cuba, Mexico and Central America, where more subscribers are greeted. In South America we'll shake hands with subscribers in Argentina, Brazil, Colombia, Chile, Ecuador, Peru, Uruguay and Venezuela. We embark on a long ocean voyage and pay a cordial visit to subscribers in Malta, Austria, Belgium, Czecho-Slovakia, Denmark, France, Germany, Great Britain, Holland, Hungary, Italy, Finland, Norway, Poland, Portugal, Spain, Switzerland, Sweden. We'll jump across Europe now and find friends in Turkey, India, Siam, China and Japan. A big flight down to Africa, where we find old friends and new. On to the British West Indies and Danish East Indies, where you become acquainted with friendly subscribers. To Egypt, where we greet a subscriber to ELECTRIC RAILWAY JOURNAL, and if old King Tut-Ankh-Amen were reading these days, we should probably be greeted by him as a fellow subscriber. Then to Australia and New Zealand, where we pay a cheerful call on over a score of hospitable subscribers.

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Belgium	11	British West Indies	1
Czecho-Slovakia	3	Danish West Indies	4
Denmark	2	Egypt	1
France	31	Australia	21
Germany	24	New Zealand	7
Great Britain	101		

Circulation of this issue, 5,915

Advertising Index—Alphabetical, 40; Classified, 36-38; Searchlight Section, 35



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They are the Four Hundred Companies today operating Safety Cars for which we supplied the Air Brake and Safety Car Control Equipment.

Our equipment makes *any* car a Safety Car.

Over 7,000 cars—new and old—equipped to date.

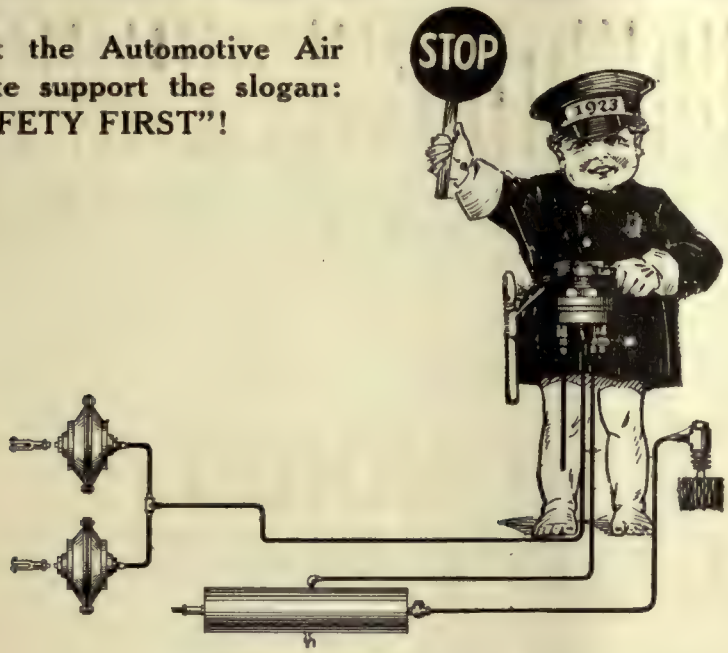
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To the 90-odd Street Car Companies Operating Motor Buses:

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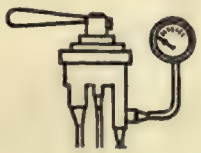
With your Buses equipped with Air Brakes, the Riding Public will have the same degree of Safety that is common to the other forms of transportation you provide.

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International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas
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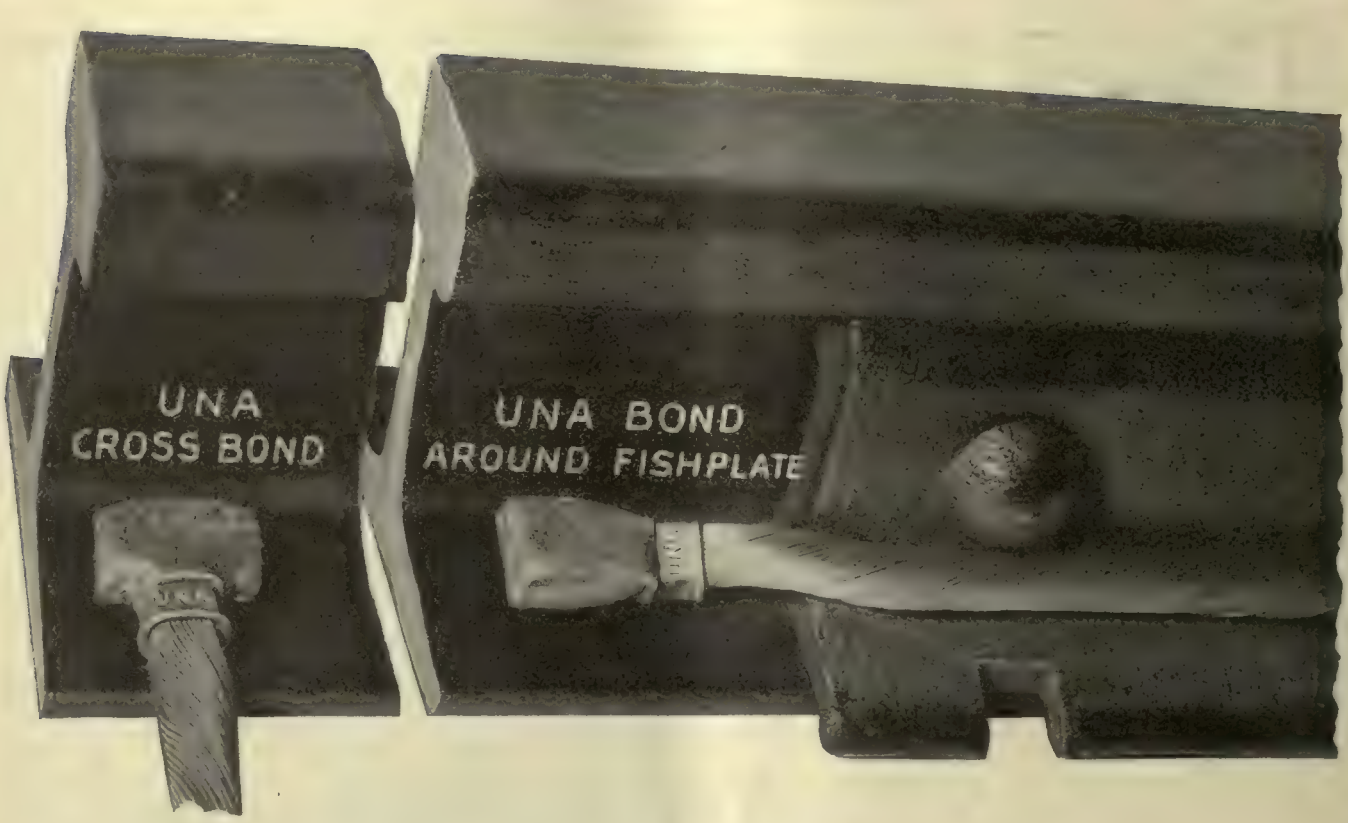
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The International Steel Tie Company
Cleveland



Steel Twin Tie Track



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Regardless of the type of UNA Bond, copper alone carries the current from rail to rail. This very fact means that power savings are a maximum and the full value of good bonding is realized.

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RAIL WELDING & BONDING COMPANY

Cleveland, Ohio

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Compensating Fixtures





Keystone Compensating Fixtures are but one of hundreds of car equipment specialties bearing the Keystone trade-mark. Like all other specialties these fixtures have been thoroughly tried out in service before being introduced by the E.S.S.Co. organization.

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Greatly reduced cost of lamp renewals.
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Vastly improved appearance and lessened glare.
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The Surface Car Still Leads

Keep it ahead!

Although the motor bus has made a place for itself, and is undoubtedly destined to play a constantly growing part in every properly-developed, well-balanced transportation system, nevertheless it has not and probably never can replace the good old surface electric car for handling mass transportation.

But the surface car must keep up with the times in order to hold its rightful place in the modern scheme of things. It must be fast and safe, capable of handling more passengers without congestion in shorter time. It is with National Pneumatic Equipment that these requirements are being met most successfully by the up-to-date electric railway companies.

To modernize and speed up transportation, plan on one or more of these National Pneumatic Devices.

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control — Door and Step Operating Mechanisms
Motorman's Signal Lights — Safety Interlocking Door Control
Multiple Unit Door Control

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Manufactured in Canada by
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Galena Electric Railway Lubricants have an enviable record of accomplishment. Their reputation for efficiency and economy has been earned in the open field of practical service. They have repeatedly demonstrated their ability in tests with other oils.

In every section of the country, Galena Oils are in daily use on the power house and rolling equipment of electric railroads—not merely on a few isolated properties, but on hundreds, including the largest and heaviest traffic carrying lines. Their records of performance in mileage, freedom from bearing troubles and in making possible better operating conditions, may be found in the reports of any road under Galena lubrication.

These reports are usually available to other roads and should furnish a reliable source of comparison to roads engaged in similar service. They may safely be accepted as real evidence that should far outweigh general assertions. We will gladly refer you to Galena lubricated equipment comparable with yours.

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You'll find Galena Service pay!"

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Galena-Signal Oil Company

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QUALITY · SERVICE · ECONOMY G S O GALENA OILS

In dealing with the problems of brush application, knowledge of the motor counts highly



Section of assembly floor at Erie (Pa.) Works, where upwards of 5000 G-E Railway motors are built and tested annually.



What's back of *your* brushes?

You have to know the motor in order to specify its brushes. The brushes are as much a part of the motor as its coils, armature, or the frame. They give best commutation only when suited to the motor's characteristics and its job.

One recommendation for G-E Carbon Brushes is the engineering organization back of them, which has produced railway motors since the industry began.

Drawing from this experience with motors, their design, manufacture, and application, G-E brush specialists are well equipped. Why not submit to them your problem?

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New York, Saturday, June 9, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61
Number 23

The Double-Deck Vehicle Has Its Limitations

A COMPARISON of the street space occupied by street cars and buses, as determined for British and American designs, is given in the report of Daniel L. Turner, consulting engineer to the New York Transit Commission, abstracted in this week's issue. Mr. Turner states: "With us, the policy of carrying standing passengers to the limit has resulted in a type of vehicle most extravagant in the use of street space." He argues that it is time to change this policy and compel the production of a type of car that will utilize the roadway space more economically, such as the New York Railways double-deck car.

There is no question that a given area divided between two floors takes less ground space than with a single floor. While space must be reserved for stairways, more usable area can, in general, be obtained by double-decking, so that more seats, or more standing room, or both, can be provided in a double-deck design. Those who are familiar with the New York double-deck car, however, may take issue as to this being a desirable type for general use with frequent stops in congested streets.

The real limitation in two-story designs is in getting people in or out. Considerable difficulty is encountered in nearly all the designs, as only a limited amount of space can be allotted to doors and stairways. There is a limit to what the car patron will stand for in boarding and alighting time—the standing time of the car at stops. Each passenger wants to get off without delay at his stop, and those desiring to get on do not want to wait until the others are off. A more or less definite time per passenger is required, dependent on the design of doors, stairways and steps.

The speed of vehicle movement is limited very distinctly by the time consumed in this way in loading and unloading. Our British cousins, more leisurely in their habits, do not object to the use of a little extra time, while the same thing would bring vociferous protests in this country.

Then, too, it is possible in Great Britain to limit the number of passengers on a vehicle to its seating capacity. By this means there is no crowding about the doors, with the attendant confusion and congestion. Some few American systems have tried the "car full' method, but it never has been popular, and where adopted it has been impossible to prevent passengers from disregarding it almost at will. In the few cases in this country where double-deck buses have been used for so-called de luxe transportation, with the carrying capacity limited strictly to the seats, no difficulty has been encountered.

The passenger capacity figured by Mr. Turner for a double-deck open-top vehicle is based on the seats being available at all times. Experience in this country shows that passengers will not ride on an open upper deck in bad weather, so that as an all-year proposition this figure for seating capacity does not give a fair comparison with inclosed single-deck designs.

Neither the square feet of ground space per seat nor the length occupied in the traffic stream gives a fair comparison of congestion on the street produced by various types of vehicles. With a double-deck design the running time undoubtedly is increased on account of delays due to the time used by passengers climbing the stairs, and by the greater number of persons who must use the limited door space. And the standing of cars tends to increase the traffic congestion.

If the element of time were introduced into Mr. Turner's factor, the comparison would not be so much against the single-deck design in the matter of congestion.

Surface Car Subways Not an Economic Advantage

AN IMPORTANT question of economic feasibility is raised by the discussion in Detroit, Chicago and other cities of building subways for the use of the street cars in the congested business districts. If this is done, it will be for the sake primarily of relieving surface traffic congestion and to speed up service somewhat, and not because it makes a saving in the cost of transportation.

For normal surface roads the investment varies between $2 and $5 for each dollar of annual revenue, while for rapid transit lines it may be as high as $10. A few subway lines show an even higher investment.

With $3.50 invested per dollar of annual gross business and a 7 per cent rate of return, 24½ cents out of each dollar of gross must be paid out for the use of the capital. With $10 invested per dollar of gross and a 5 per cent return—a rate possible only on a pre-war investment or when the enterprise is financed by some governmental agency, at least for the roadway and structures—some 50 cents out of each dollar must go to capital charges.

A rapid transit line should have two advantages over the surface road to make possible the payment of the increased charges, namely, greater density of business and lower costs of operation per passenger hauled. These things, generally speaking, are inseparable. The lower unit costs possible with dense traffic come about through train operation, with few stops and small labor charges.

When a rapid transit structure, whether elevated or subway, is used for the operation of surface cars, especially when the cars are run as single units, it is not possible to crowd enough of them in, or to carry enough passengers in each of them, to keep the cost of operation sufficiently low to allow a fair return on the high investment; for as the density of business goes down the investment per dollar of business goes up. In prac-

tice, even with economies of all sorts, it has not been found possible to lower the operating ratio, including taxes, under present conditions to much less than 75 per cent for normal surface lines and 50 per cent for rapid transit lines, and this is with a fare generally higher than the traditional nickel of pre-war days. Thus each class of road is just about able to earn the permitted rate of return on its investment.

If surface cars are put into a subway and operated in the usual manner, the high operating ratio remains, as there are few economies that can be realized by virtue of this kind of operation. The result is that to operating costs of some 75 cents per dollar of gross business must be added a return on capital of nearly 50 cents. No means has yet been found to pay $1.25 out of receipts of $1, at least for any length of time. Mayor Hylan has essayed to do it, but the car rider does not realize—or care—that the taxpayer is contributing about 1 cent for each nickel paid the railway as carfare, in order to carry the interest charges on the subways.

Special conditions may arise where it is considered desirable for the good of the community to take surface cars off the streets. This was pointed out in this column last week. But it should also be remembered that it is an expensive proposition, since the diversion of the surface cars from the thoroughfares for short distances does not enable them to earn any more. True, they can get through the congested district with greater ease, and so reduce operating costs slightly, but this is perhaps offset by a loss in revenue due to the less advantageous location for short-haul riders. Passengers of this class cannot be induced to go out of their way, to or from a station, even for a few hundred feet, and the necessity to climb stairs acts as a deterrent to riding when the walking is good.

In Boston, which was referred to in last week's editorial, the street cars were taken off the surface and put in expensive subways. This was a main contributing cause leading to the increase of the fare from 5 cents to 10 cents, as it was shown in 1917 that the cost of hauling a surface car passenger was less than 5 cents, of a rapid transit passenger was 7½ cents and of a passenger on a subway-surface car 8⅓ cents. It does not follow that the same ratio will hold in the other cities contemplating subways, but there will be an increase in the cost of handling passengers. That it must be borne by some one is evident and those who urge surface car subways should realize that the railway company cannot be expected to carry the burden without some special concession in the way of increased revenue or reduced expenses.

Safety on Walkway Surfaces Is a Big Problem

THE formulation of a safety code for walkway surfaces, mentioned elsewhere in this issue, is a subject in which electric railways should have a keen interest. Great effort has been made to reduce the huge sums paid in accident claims, but the serious nature of the slipping hazard has often been overlooked. A slight danger to thousands of people is worse than a far greater danger to only one or two people. Statistics show that there is no other single hazard so serious as that of falls, and that most falls are caused by slipping. Falls are not confined to industry. On the contrary, the hazard to the general public is even more serious. In New York City, for example, it is exceeded only by that attributable to automobiles.

On an electric railway property there are many chances for people to fall. Platforms, stairs, ramps, car steps, door sills, and car floors may be safe or hazardous, depending on whether or not anti-slipping precautions have been carefully taken. It is not enough to slap down any so-called "safe walkway surface" and let it go at that. An improper stair tread, for example, may be more hazardous than no tread at all. The plan now under way to establish a national code of specifications for safe walkway surfaces, therefore, should be a big help in determining the sort of protection most suitable in any given situation.

Utility Publicity Prominent in Two Programs This Week

THIS has been a notable week for utility publicity, which at last is becoming recognized as one of the most important phases of the business of public service corporations. It is hard to realize that a few years ago some street railway managers looked upon the advertising of their facilities and even of their methods and policies as unnecessary. "What have we to advertise?" they would say. "People will have to ride on our cars whether we advertise or not, and advertising is a waste of money in these circumstances." This week the Associated Public Utilities Advertising Association held a two-day session at Atlantic City, as part of the convention of the Associated Advertising Clubs of the World, and a considerable portion of the meeting of the National Electric Light Association this week was set aside to the subject of public relations.

Undoubtedly the extension of state public utility information bureaus has had a great deal to do with the better understanding now had by utility companies of the need and proper method of public utility publicity. The first of these bureaus was started only about four years ago, but they have effectively taught the lesson that the utilities have a responsibility in the matter of publicity which they should not shirk. The burden falls on them because there is no one else sufficiently interested to do it. Some of this work can most economically be carried on through a state organization in which all of the utilities have a share, and much duplication of work which would otherwise occur is avoided, and some part can be done by the national association.

Of course the scope of a proper policy of publicity is much broader than the activities usually associated with the work of the information bureaus or that expressed by the word "advertising," unless the latter term is understood in its most comprehensive sense. Thus, the committees reporting at the first public relations session of the N. E. L. A. included those on co-operation with educational institutions, employee relations with the public, information bureau organizations, manufacturers' advertising, public speaking, relations with financial institutions and women's public information. Still, the testimony at both conventions clearly brought out the fact that any successful publicity policy must include considerable direct advertising as one of the most effective means of carrying the desired message to the public, and that this advertising should be continuous, not used only when some crisis arises in the company's affairs. In this connection it is interesting to note that W. C. Strandborg of the Portland Railway, Light & Power Company and president of the Public Utilities Advertising Association has estimated that on a minimum basis of 2 per cent of their annual gross business the four major utilities, electric railways, gas companies, light and power companies and telephone companies, should be spending about $60,000,000 a year for advertising instead of $7,500,000 as at present.





Turnback Loop Recently Installed on Purchased Property, Yonge Street Line. The Right-Hand View Shows in Greater Detail the Loading Platform on the Loop

Speeding Up Traffic in Toronto

By Judicious Spacing of Stops, the Schedule Speed Has Been Increased 4.5 per Cent in Normal Service and 10.3 per Cent in Rush-Hour Service—Other Traffic Studies Made

THE Toronto Transportation Commission has an official known as engineer of traffic study, one of whose principal duties is to study the possible needs of changes in routing because of changes in passenger movement. This official, N. D. Wilson, has a force of six men constantly in the field making periodical audits of traffic, besides an office force working up the results obtained by these checkers. His department is entirely distinct from the traffic department, whose traffic checking as a basis for car service consists largely in tabulating the loads at the peak-load points, which are mainly downtown.

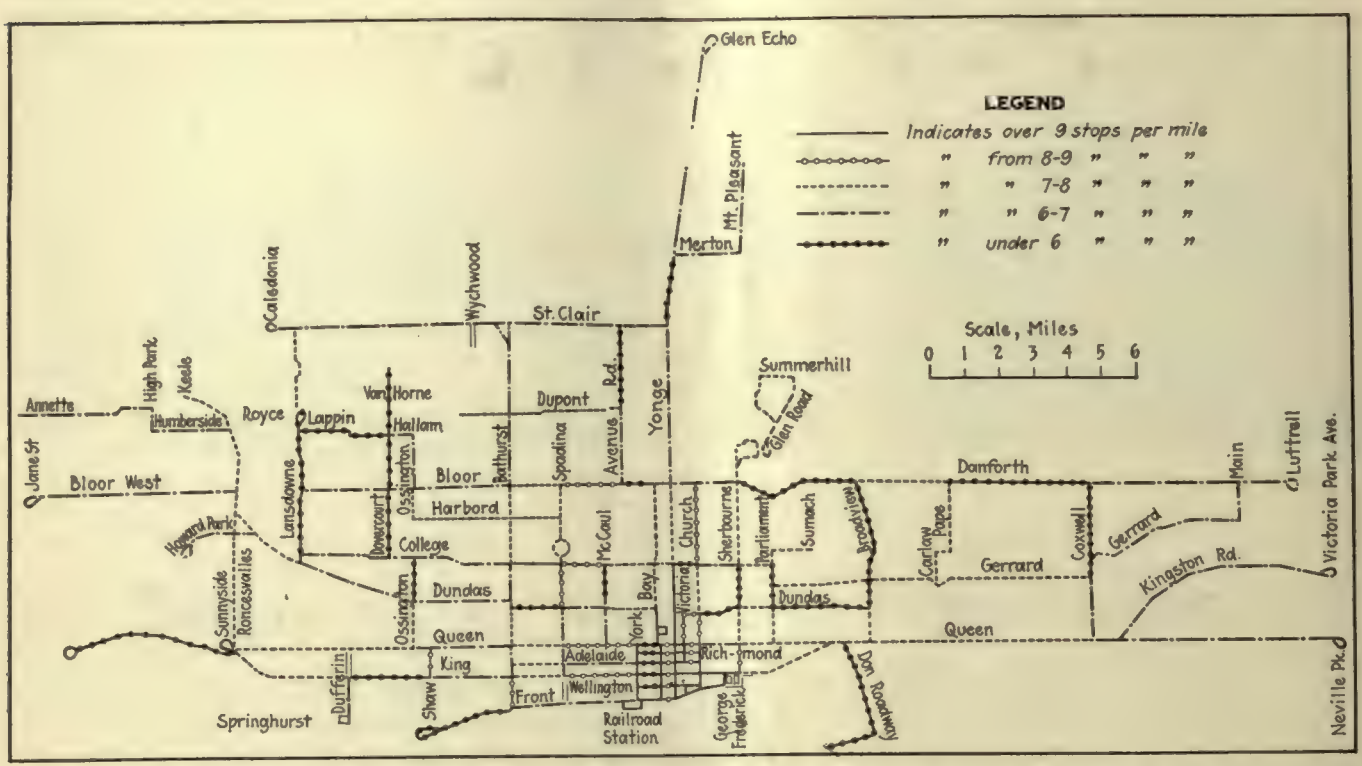
The checkers of the traffic engineer, on the other hand, work mostly outside the downtown area, to determine how service might be improved and car-mileage saved by changes in routing or by turnbacks. The department also has to do with stop locations and probable extensions, and other questions arising from the street plan, or from the lack of grade separation, etc. Among its records it maintains up to date a spot population map of the city and suburbs, as well as monthly traffic charts of each line showing the growth of each relative to the growth of traffic on the whole system. Investigations as to the merits of complaints regarding the inadequacy of service from individuals or districts is handled by the traffic study department. It also advises in regard to special trackwork to be installed, in so far as the design would be affected by rerouting.

The street system of Toronto is rectangular and almost all of the streets are 66 ft. wide. This feature has at least the merit that special trackwork is standardized to an unusual degree. One great difficulty is that the cross streets do not directly cross the main thoroughfare but frequently jog 30 to 100 ft. or more, so that the cross-street traffic has to travel that distance on the main thoroughfare. It is partly for this reason that as traffic, both vehicular and street railway, has increased, endeavor has been made to develop U-shaped routes for the districts in the northeast and northwest parts of the city rather than routes which would send the passengers over the two principal north and south lines, which are overtaxed now. In this rerouting also the management has made an effort to develop certain main routes where two-car trains could be operated for most of the day.

COMPARATIVE STATEMENT OF ROUTE LENGTHS, STOPS PER MILE, AND SCHEDULE SPEEDS, TORONTO

Route	Length in Miles		Stops per Mile		Schedule Speeds, Miles per Hour Normal Hours		Rush Hours	
	Sept. 1, 1921	Jan. 11, 1923	Sept. 1, 1921	Jan. 11, 1923	Sept. 1, 1921	Jan. 11, 1923	Sept. 1, 1921	Jan. 11, 1923
Ashbridges	2.36	2.36	5.10	5.10	9.44	9.44	9.44	9.44
Avenue Road	6.90	12.41	10.30	7.90	8.62	9.80	7.96	9.08
Bathurst	8.84	9.64N		8.00N				
		12.36R	8.80	7.30R	9.46	9.98	8.84	9.76
Bloor	8.98	9.03N		6.21N				
		12.75R	8.13	6.12R	9.98	10.05	8.70	9.57
Bloor West	2.46	3.30	8.13	7.87	9.24	9.00	9.24	8.25
Broadview	5.72	12.45	9.10	6.41	9.02	10.37	8.16	9.57
Carlton	11.77	10.82	9.25	7.12	9.82	9.57	9.28	9.57
Church	6.15	6.15	9.75	8.95	8.38	8.80	8.03	8.03
Church Tripper		13.10		6.80				9.83
College	10.45	10.42	9.17	7.30	9.50	9.20	8.96	8.94
Coxwell		2.40		5.82		8.00		8.00
Danforth	6.80	See Broad.	7.50	See Broad.	9.72	See Broad.	9.72	See Broad.
Dovercourt	4.97	4.97	7.25	6.45	9.32	9.95	9.04	9.32
Dundas	10.62	10.01	8.85	7.26	9.38	10.36	8.85	9.70
Dupont	7.32	6.79	10.22	7.80	8.78	9.70	8.13	8.86
Gerrard	3.64	5.13	8.52	6.63	9.93	10.26	9.93	9 63
Harbord	10.39	10.54	7.80	7.20	10.05	10.54	9.45	9.90
Humberside (double-deck gas bus)		3.68		7.06		9.20		8.50
King	17.83	20.21	8.03	6.85	10.70	10.75	9.75	10.20
Kingston Road		3.86		6.74		9.65		8.92
Lansdowne	1.17	1.17	8.55	8.55	5.85	5.85	5.85	5.85
Mount Pleasant (trolley bus)		2.45		7.35		9.20		9.20
Pape		1.71		8.20		8.55		8.55
Queen	15.80	16.73N		7.45N				
		20.90R	8.87	7.28R	9.30	10.45	8.47	9.95
Queen Tripper		11.65		7.38				9.70
Rosedale (single-deck gas bus)		1.90		6.40		8.03		8.03
St. Clair	6.36	0.71	8.50	8.60	10.60	5.33	10.60	5.33
Sherbourne	5.88	5.88	8.68	7.65	8.83	9.05	8.61	9.05
Spadina	5.88	5.88	8.68	7.65	8.83	9.05	8.61	9.05
Winchester	3.96	3.60	9.85	7.50	8.50	9.00	7.92	8.30
Yonge	6.36		10.70		8.68		7.35	
Yonge-Scott Delcraine		12.60		7.15		10.21		8.80
Yonge-Station-Lawton		7.40		8.38		8.23		7.93
Average of all lines			8.70	7.25	9.38	9.81	8.81	9.72
				—16.7%		+4.5%		+10.3%

Note:—The average for all lines was secured by weighting the various items according to the length of route provided in normal hours, except in the case of rush hour schedule speeds, when the rush hour mileage was used.
N—stands for normal; R—for rush.

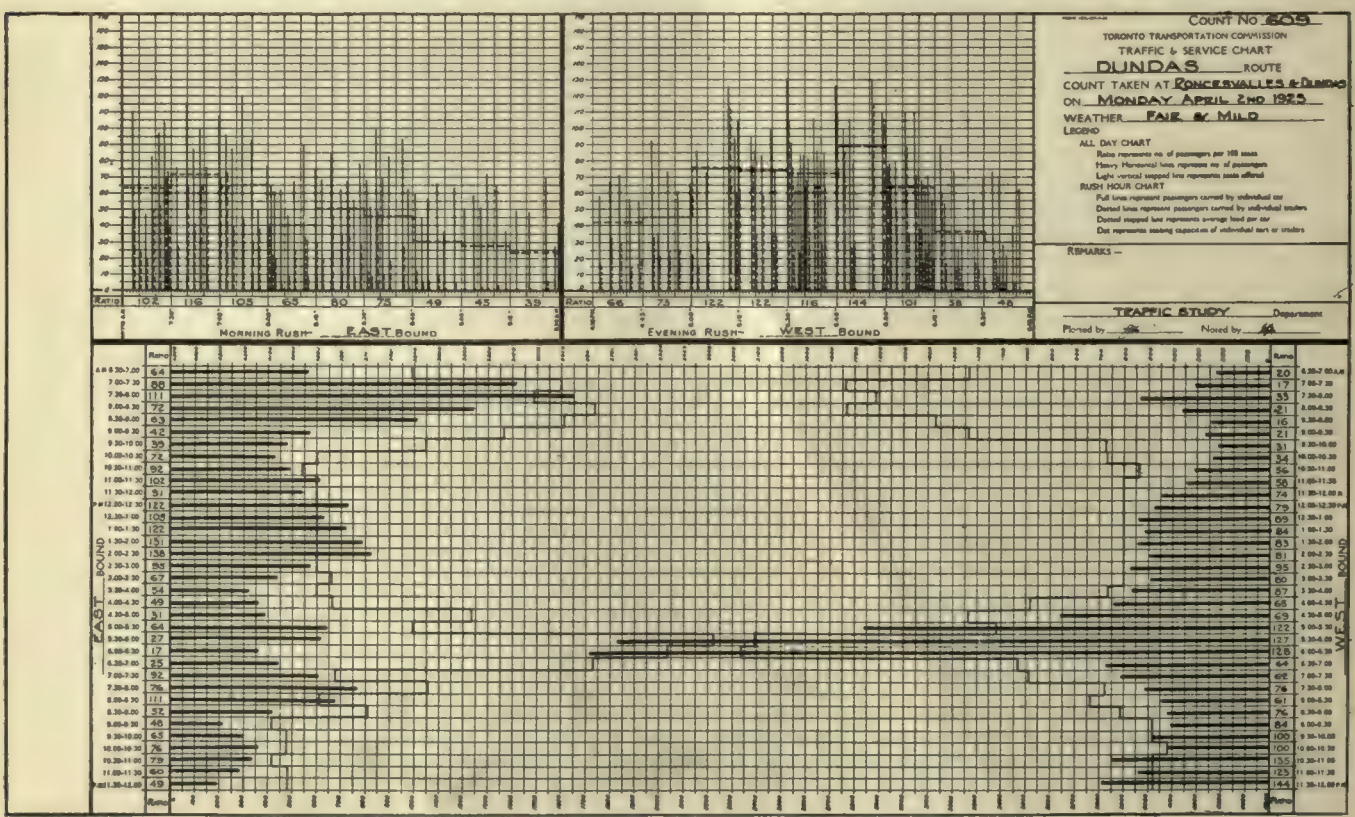


Map Showing the Layout of the Toronto Street Railway System, as of Jan. 1, 1923, with Number of Stops per Mile on Each Section

The comparative statement of route-lengths, stops per mile, etc., accompanying this article shows that the management has been quite successful in increasing schedule speed without increasing maximum speed. The chart shows the number of stops per mile in different parts of the city. In general, the aim has been to place stops in the outskirts not more than 1,000 ft. or less than 600 ft. apart, making an average of about seven to the mile. Downtown the stops are closer together.

For the system as a whole, between Sept. 1, 1921, and Jan. 11, 1923, the designated stops per mile have been decreased 16.7 per cent, while the schedule speed has so far been increased 4.5 per cent in normal hours and 10.3 per cent in rush hours.

In this same connection, since the lines of the Toronto Railway were taken over on Sept. 1, 1921, ten additional terminal and turnback loops have been installed, making twelve all told, and several more are projected.



Form Used by Traffic Study Department for Charting Traffic Service Data

The form on which the records of individual lines made by the inspectors are kept by the traffic study department is shown in the large chart on page 952. In the all-day chart, which is the lower record, "Ratio" represents the number of passengers per 100 seats, the heavy horizontal lines represent the number of passengers and the light stepped lines represent the number of seats offered.

The two upper charts show conditions in the rush hours. Here the full lines represent the passengers carried by individual cars, the dotted lines represent the passengers carried by individual trailers, the dotted stepped line represents the average load for the fifteen-minute period per motor car, and the circles represent the seating capacity of individual motor cars or trailers.

In the course of its rehabilitation of the property the commission has installed three bus routes, as shown on the map and also in the table. The bus equipment altogether consists of eight double-deck gas buses, three single-deck gas buses and four trolley buses. These buses have not yet been in operation long enough or under such conditions as to give definite figures of cost of operation, but some conclusions can be drawn. One of these is that the trolley bus shows slightly less operating cost than the one-man single-deck gas bus, and this difference, in the opinion of the management, will grow greater, as the maintenance cost of the gas bus will increase at a greater ratio than that of the trolley bus. Another conclusion drawn from the results of operation is that the two-man double-deck bus costs more to operate than a two-man trolley car.

Denver Tramway Valued at $31,330,568

Going Concern Value, Included at $4,000,000, Analyzed to Cover the Historical Development Costs, Which Have Many Phases in Denver

AFTER over two years in the hands of a receiver, during which time the Denver Tramway Company and the city of Denver have been unable to agree on a proper permanent fare, the matter is now coming up for settlement in the Federal Court.

The city of Denver is seeking to re-establish a 6-cent fare, and the company, through E. Stenger, receiver, is seeking a permanent injunction to restrain the city from enforcing its 6-cent fare ordinance of 1919, which he claims would be confiscatory. The company has operated under an 8-cent fare with 7½-cent ticket fare since March, 1921, under order of the Federal Court.

At the hearing before Special Master Henry A. Dubbs, appointed by the United States Court, A. L. Drum, consulting engineer, Chicago, submitted valuations of the property prepared on the following bases:

Present-Day Cost: Minimum amount of capital required actually to reproduce the physical property existing as of Dec. 31, 1922, derived by applying to the Dec. 31, 1922, inventory units, the prices of labor, material, apparatus and equipment which prevailed as of Dec. 31, 1922.

Three-Year Average Cost: Minimum amount of capital required actually to reproduce the physical property existing as of Dec. 31, 1922, derived by applying to the Dec. 31, 1922, inventory units, the average prices of labor, material, apparatus and equipment which prevailed during the three-year period, 1920 to 1922, inclusive.

The valuations submitted by Mr. Drum on these bases summarize as follows:

SUMMARY OF COST OF REPRODUCING AND DEVELOPING THE PROPERTY AS OF DEC. 31, 1922

Item	Present-Day Cost, Prices Current Dec. 31, 1922	Three-Year Average Cost, Average Prices 1920-1922
Total physical property	$27,330,568	$29,071,181
Going concern value	4,000,000	4,000,000
Total	$31,330,568	$33,071,181

The property covered by the valuation comprises the entire street railway system located within the corporate limits of Denver, with lines to Englewood, Aurora and Fairmount Cemetery, outside of the city limits but within the one-fare zone; and three rotary-converter substations with high-tension transmission lines leading to them located outside the city limits, from which direct-current power is sold to the interurban lines. The system consists principally of 201.7 miles of single track; lands; power distribution system, consisting of overhead trolley and feeder lines; high-tension transmission lines; cars and equipment; carhouses, general office building, shops and miscellaneous buildings; nine rotary-converter substations having an aggregate capacity of 7,000 kw., including the three substations outside the city limits; one power station with equipment having a generating capacity of 16,200 kw., and one 3,000-kw. rotary converter unit; shop equipment; tools; furniture; etc.

The presentation of the claim for "going concern value" was made by Mr. Drum generally on the basis that the Denver Tramway Company has passed through the following stages of development: (1) Construction period; (2) developmental period of construction; (3) period of unifying and creating the existing system; (4) the period of development into a successful going concern.

Mr. Drum testified that in reaching the figure of $4,000,000 for going value he had investigated the financial history of the company and ascertained the developmental cost of establishing the system as an efficient operating going concern, including the expenditures made for developmental equipment and construction, the cost of unifying the system, etc.

The report states that the developmental costs represent capital ascertained to have been prudently invested in the business, and necessarily expended in the early developmental and experimental years in overcoming initial difficulties incident to creating and developing the property of the company to its present state of efficiency. These capital expenditures were made for property during the several periods of evolution of the physical means of transportation, which property has since been superseded or abandoned, due to the development in the art of transportation. They represent capital invested in the property which has not been returned to the investor from earnings and therefore continues to be an inherent and proper part of the value of property now existing as a going concern.

Historical Development of the Tramway

The horse-car period in Denver began in 1871-1872 and continued until 1889, when all horse car lines and equipment were replaced by cable lines, with the exception of the Argo line, which was replaced by an electric line in 1900. The horse car system consisted of about 21 miles of narrow-gage track, three buildings and 110 horse cars.

CLASSIFIED SUMMARY OF THE COST TO REPRODUCE NEW THE PHYSICAL PROPERTY OF THE DENVER TRAMWAY COMPANY, AS OF DEC. 31, 1922

Division	Present-Day Cost, Prices Current Dec. 31, 1922	Three-Year Average Cost, Average Prices 1920-1922
Land and right-of-way	$1,333,456	$1,333,456
Track	5,347,255	5,745,873
Bridges, viaducts, trestles and culverts	856,231	856,662
Paving	1,412,005	1,438,403
Electrical distribution system	1,109,285	1,177,598
Rolling stock	4,445,233	4,873,867
Power station equipment	1,598,098	1,767,777
Substation equipment	303,156	342,026
Shop and miscellaneous equipment, tools, and supplies	391,514	453,373
Buildings	2,950,023	3,135,419
Furniture and fixtures	174,716	213,572
General stores	507,599	507,599
Cost of franchises	284,100	284,100
Engineering and superintendence	1,035,634	1,106,486
Administration, organization and legal expense	953,010	953,010
Taxes during construction	325,220	317,425
Interest during construction	2,763,184	2,940,799
Working capital	239,394	239,394
Cost of financing	1,301,455	1,384,342
Total physical property	$27,330,568	$29,071,181

HISTORICAL DEVELOPMENT COSTS FOR DENVER TRAMWAY COMPANY

Horse car lines	$224,825
Conduit electric lines	185,012
Cable lines	1,861,119
Initial electric development	1,431,546
Track superseded on account civic improvements	1,048,247
Total	$4,750,749
Cost to unify system	174,076
Cost of placing the physical property in successful operation	2,733,057
Total development costs	$7,657,882

Three steam motor lines were operated for a very short period and were electrified about 1890-1891.

A conduit electric system of the Short patent was constructed and operated on Fifteenth Street from Tremont to West Twenty-ninth Avenue from 1885 to 1887, but, on account of the electrical system not having been sufficiently developed at that early date, the operation was found unsatisfactory and it became necessary to abandon the conduit electric system and replace it with a cable system.

The construction of the cable lines, comprising 49.0 miles of cable track, started in 1888, and on account of the development of electric traction, the abandonment of cable lines was necessitated, 1895 to 1900, after but a short period of operation, notwithstanding the fact that over $4,000,000 of capital had been invested in their construction.

The initial development of electric traction commenced in 1890, and the early experimental stages continued until about 1903. During this period the company made five separate electric power station developments, the equipment of which was superseded within twelve years due to the rapid development in the electric art. All of the single-truck electric cars were replaced by modern double-truck cars, and 62.5 miles of track was removed and required replacement before the expiration of its useful life on account of new paving ordered by the city, or on account of the use of heavier and larger cars.

Cost to Unify and Place in Operation

The cost to unify the system, as set forth by the consultant, represents an estimate of the cost incident to creating and consolidating the thirty-one original companies into what now comprises the Denver Tramway Company, city lines only.

In addition to the cost of the component parts of the bare physical property, the cost of placing the physical property in successful operation, that is, the cost of converting the inert railway plant into a successful operating system, is an element of cost in creating a street railway system. In determining the amount of this item of cost, the fact is considered that the Denver Tramway Company is in active and successful operation and has passed through the period between the beginning of operation and the time when the business earns not only operating expenses and taxes, but also a return on the investment.

The business of the company has been built up, the service and equipment have been planned and perfected successfully to serve the business, an experienced and successful operating staff has been organized, trained and perfected in its duties, and extensions have been made into unpopulated territory requiring many years of operation before the increase in population, due to the construction of such extensions, has created traffic sufficient to pay the operating expenses and interest on the capital invested in such extensions.

This cost of placing the physical property in successful operation is estimated to be not less than 10 per cent of the cost of the component parts of the physical property.

Accrued Depreciation

The accrued depreciation of the property claimed by the engineer represents the amount of actual existing physical depreciation due to wear and use, as ascertained and determined by an inspection of the property in the field. The result of the inspection of the property indicates that the present service condition of the property is practically as good as new, and with a few exceptions such as some deferred maintenance on track, the actual existing depreciation as found does not materially affect the service condition of the property. The amount of accrued depreciation was shown as follows:

On basis of present-day cost, prices current as of Dec. 31, 1922, $2,516,563.

On basis of three-year average cost, average prices during the three-year period, 1920-1922, $2,711,533.

Metropolitan Railway Locomotive Reconstruction

Important English Railway Remodels Score of Locomotives to Permit More Efficient Handling of London Suburban Traffic

A LARGE electric locomotive reconstruction job has recently been undertaken for the Metropolitan Railway, England. It comprises the rebuilding of twenty machines, resulting in virtually new equipment.



Photo by International News Reel

Remodeled Electric Locomotive for Metropolitan Railway, England
One-hour rating is 1,200 hp. at 600 volts and 30 m.p.h.

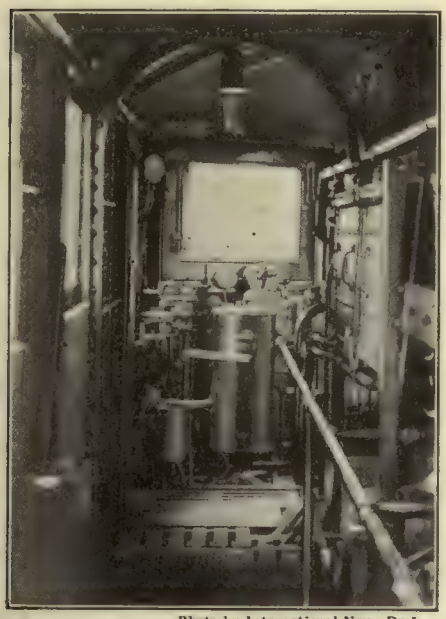


Photo by International News Reel

Engineer's Operating Position in Cab, Showing Also Some of the Control Apparatus in the Center of the Cab

The work is being done by Vickers, Ltd., the electrical apparatus being supplied by the Metropolitan-Vickers Electrical Company, Ltd. The locomotives are of simple construction, consisting of two trucks, carrying a steel cab mounted on a substantial steel underframe. This underframe takes the buffing stresses. The trucks carry each two motors, of 300 hp. capacity at 600 volts and at the one-hour rating. The one-hour rating of the locomotive as a whole is, therefore, 1,200 hp. The locomotive is provided with both vacuum and pressure brakes, the former being used in regular service and the latter for shifting purposes.

The control is of the Metropolitan-Vickers all-electric type, with automatic acceleration. All auxiliary apparatus is mounted in the center of the cab, leaving a passageway all around.

This road uses two contact rails, one for the positive and one for the negative current. The former is at the side of the track, the latter in the center. The locomotive, therefore, had to be supplied with two sets of collecting shoes. One set is connected to a positive busbar in a control cabinet at one end of the locomotive, while the other goes to a negative busbar at the other end of the locomotive.

The control is of the multiple-unit type, so that two or more locomotives can be operated from one master controller. Bus lines are also provided for connection with a power bus on the coaches, some of which are provided with auxiliary collecting shoes to insure continuity of contact with the conducting rails.

Particular interest attaches to the braking system, which is novel compared with American practice. To supply air for the pressure brakes, a compressor with a capacity of 38 cu.ft. displacement per minute, driven by an 8-hp. motor, is provided. For the vacuum brakes there are two exhausters, one to offset the effect of leaks in the vacuum train pipes and the other to provide sufficient capacity for releasing the brakes quickly. The brakes are interlocked with the motor control in such a way that current cannot be supplied to the motors unless the brakes are released. Similarly, the interlocks prevent operation of the motors unless one of the brake systems is ready for use.

The weight of the locomotive in working order is about 63 tons (2,000 lb.); its length over the buffers is 39½ ft., its length over the body is 35 ft., and its width over the body is 8 ft.

The Metropolitan Railway, the operator of these locomotives, is one of the underground railways in London.

Conductors Make Traffic Counts in Milwaukee

The Plan Has Been Found Entirely Practical Where Great Accuracy Is Not Required—Traffic Count Continues for Three Days

AT ONE TIME schedules on many roads were drafted largely by guesswork, and when once established they continued in force for a long time except for the usual seasonal and week-day variations. Now the principle is generally accepted that continuous study and revision of schedules is one of the most important duties of the transportation department, if efficiency and economy of operation are desired. This means that traffic checks frequently must be made on different lines, and the more often they are made, within reasonable limits, the better.

The general practice is to use special men for this

TRAFFIC RECORD

Conductor will look at watch and record **ACTUAL TIME** of leaving checking point and **GREATEST LOAD** on car at that point. See below for list of checking points, and seating capacity of cars.

INBOUND means **toward center of town** on lines running down town; **southbound** on 27th St. and 35th St.; and **eastbound** on North Ave. and Center St.

OUTBOUND means **away from center** of town on lines running down town; **northbound** on 27th St. and 35th St.; and **westbound** on North Ave. and Center St.

	CHECK POINT Biddle & Jackson		CHECK POINT 12th & Wells			CHECK POINT 12th & Wells		CHECK POINT Biddle & Jackson	
Car Number	Inbound		Outbound		Car Number	Inbound		Outbound	
	Time	No. of Pass.	Time	No. of Pass.		Time	No. of Pass.	Time	No. of Pass.
550	6[22] M	70	6[29] M	20		7[22] M	75	7[35] M	15
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	
	M		M			M		M	

LINE	CHECKING POINT
Wells St.	12th and Wells
Downer Ave.	Biddle and Jackson
12th St.	12th and Cherry
State St.	13th and State
Clybourn St.	17th and Clybourn
Oakland Ave.	Cass and Brady
Delaware Ave.	Kinnickinnic & Maple
Holton St.	Holton and Harmon
Mitchell St.	Reed and Mitchell
National	1st and National
Fond du Lac	13th and Fond du Lac
Walnut	13th and Walnut
Vliet St.	13th and Vliet

LINE	CHECKING POINT
Howell Ave.	Clinton and Maple
1st Ave.	Reed and Mitchell
3rd St.	3rd and Sherman
8th Ave.	Greenbush and Greenfield
Burnham	Greenbush and Greenfield
8th St.	7th and Germania
Muskego	11th and Weiler
North Ave.	Teutonia and North
Center St.	4th and Center
35th St.	35th and Cherry
27th	27th and Prairie
North via 8th	8th and Garfield
12th Viaduct	16th and Clybourn

SEATING CAPACITY OF CARS

	SINGLE UNITS					TRAINS						
TYPE OF CAR	251 500	501 600	601 660	800 899	900 One Man	3 Truck	200–400		600–200		700–700	
							Motor	Trailer	Motor	Trailer	Motor	Trailer
STOVE IN	42	52	50	51	55	103	44	44	50	48	54	58
STOVE OUT	44	52	52	53	57	107	46	46	52	50	56	60

The Traffic Count Form Is Printed on the Back of the Conductor's Trip Sheet

The Milwaukee Electric Railway and Light Company

WEEKDAY SATURDAY SUNDAY TRAFFIC CHECK ON _____ AT _____ BY _____

FIRST DAY DATE WEATHER SECOND DAY DATE WEATHER THIRD DAY

INBOUND PASSENGERS OUTBOUND PA

6:00–6:29			8:00–8:29			11:00–11:29			2:00–2:29			4:30–4:59			6:30–6:59			9:00–9:29			6:00–6:29			8:00–8:29			11:00–11:29			2:00–2:29		
						11:30–11:59			2:30–2:59									9:30–9:59						11:30–11:59			2:30–2:59		
6:30–6:59			8:30–8:59									5:00–5:29			7:00–7:29						6:30–6:59			8:30–8:59								

The Figures from the Trip Sheet Are First Transferred to This Blank

purpose and to station them at points of maximum traffic and also at possible turn-back points to read the loadings of the cars. Obviously, unless a large force of men is employed for this purpose, observations of individual lines can be made only rarely. A better plan, in the opinion of the Milwaukee Electric Railway & Light Company, is to have the conductors make these traffic records when a count is desired. Outside checkers are used also to some extent in special cases, but a great deal of information can be obtained by the conductor's count, if the method followed is such that it is convenient for him to make them. Indeed, as he is on the car, he can survey his load and can determine the number of passengers in some respects better than an outside observer.

Back of Trip Sheet Is Used

In Milwaukee all the space and information required for the conductor in making and putting down the figures on traffic are provided on the back of the usual conductor's trip sheet, which, in this case, calls for the number of passengers on the car at the points of checking. The back of one of the Milwaukee trip sheets is reproduced with a few figures for a through line. For example, at Biddle and Jackson, inbound in the morning, the car carries seventy passengers, but going out, at the checking point on the other side of the city, the load is only twenty. In its return trip the car naturally carries a larger number of passengers at Twelfth and Wells than it does at Biddle and Jackson.

To simplify the work of the conductor, a table is printed at the bottom of the card showing the seating capacities of the different types of cars used. If all seats are filled, it is easy for the conductor to add the number of any standing passengers to the figure shown in this table as the seating capacity of his car.

It is the practice in Milwaukee to continue a traffic count of this kind for three days. The record of the three days is then transferred, with the run numbers, to a large sheet, divided into half-hour periods and with space for all of the information contained on the conductor's trip sheet. This sheet (Form 1822) measures 17 in. x 22 in. A part only is reproduced, but it is sufficient to give a general idea of the information which can be placed upon it. From this sheet a summary is made on Form 1813. Further information regarding seats and cars operated and scheduled is added in the office. From this sheet such charts are compiled as may seem desirable, either for the company's own use or the use of the Railroad Commission. As will be seen from the large blank, the record obtained by this method does not consist merely of occasional readings of cars at certain hours, but readings of all cars at two points throughout the entire day. To get this by street checkers would require at least two shifts of four men each for each day on each route observed.

Where great accuracy is required it is possible, of course, to have supervisors ride the cars and check individual runs, and this practice is quite often followed in Milwaukee, as it has been found by experience that conductors' counts of passengers are apt to be a little high, possibly from 8 to 10 per cent in a crowded car. For a great many purposes, however, such additional checking is considered hardly necessary, especially as too high a figure is on the conservative side as regards seating capacity to be furnished.

The Milwaukee Electric Railway and Light Company

SUMMARY OF TRAFFIC CHECK No. _____

WEEKDAY
SATURDAY
SUNDAY

MAXIMUM LOAD CHECK OF _____ AT _____

FIRST DAY _____ DATE _____ WEATHER _____

SECOND DAY _____ DATE _____ WEATHER _____

THIRD DAY _____ DATE _____ WEATHER _____

PERIOD OF DAY	INBOUND									OUTBOUND								
	TOTAL PASSENGERS				SEATS		CARS			TOTAL PASSENGERS				SEATS		CARS		
	1st DAY	2nd DAY	3rd DAY	AVERAGE	FURNISHED	REQUIRED	OPERATED	SCHEDULED	REQUIRED	1st DAY	2nd DAY	3rd DAY	AVERAGE	FURNISHED	REQUIRED	OPERATED	SCHEDULED	REQUIRED
6:00–6:29																		
6:30–6:59																		
7:00–7:29																		
7:30–7:59																		
8:00–8:29																		
8:30–8:59																		
9:00–9:29																		
9:30–9:59																		

The Data Are Finally Summarized on This Blank

Street Space Occupied by Cars and Buses*

A Comparison of Various Types of Single-Deck and Double-Deck Street Cars and Buses in New York and Great Britain—On a Seat Basis Double-Deck Designs Show Up Well, but for American Conditions Cars Do Not Compare Unfavorably

By Daniel L. Turner
Consulting Engineer New York Transit Commission

ONE of the most interesting of all the features observed in England and Scotland was that the city transit companies are not as wasteful of roadway space in the public thoroughfares as they are in this country. In Liverpool, Glasgow and Edinburgh, and also in London, the vehicles used for city transportation, both cars and buses, were most economical in their use of roadway space. It is believed that the same conditions obtain practically throughout England and Scotland.

In order to compare the conditions in this city with those in England and Scotland, the general dimensions of about twenty buses and cars used in transporting city traffic have been analyzed. The results of this analysis are shown in the accompanying table.

British and American Street Cars Compared

First let us consider trolley or tramway cars. Eight types of cars are shown in the table. Three of these are Liverpool, Glasgow and London types; the other five are New York city cars. On the average the three British cars occupy 3.35 sq.ft. of roadway space per seated passenger, and in a single traffic stream occupy 0.46 lin.ft. per seated passenger. The New York cars, on the other hand, on the average occupy 6.39 sq.ft. of roadway space and 0.79 ft. in the traffic stream line per seated passenger. In other words, the New York city cars occupy almost twice as much street space as the English and Scotch cars.

But these average conditions do not tell the whole story. The average of the New York cars is brought down very materially by one car, No. 8 in the table. This car utilizes only 4.6 sq.ft. of roadway space and 0.56 lin.ft. per passenger. But of the most economical type in New York from the standpoint of street use there is only a single car.

A comparison of minimum and maximum types is interesting. The double-deck car in use on the London County Council tramway lines, No. 3 in the table, carries seventy-eight seated passengers, and it utilizes only 3.11 sq.ft. of roadway space and only 0.43 lin.ft. of traffic stream-line space per passenger. The New York double-deck car takes up 48 per cent more street space per passenger than the London car does, and 30 per cent more space in the traffic line. The new Brooklyn Peter Witt car, No. 7 in the table, is the most extravagant in street space on a seat basis in New York City, occupying 7.57 sq.ft. of roadway space and 0.94 lin.ft. per seated passenger. In other words, it uses 2.43 times more roadway space and 2.19 times more stream-line space per seated passenger than the most efficient London car.

A vehicle which would require no more street space per passenger than a pedestrian might be considered nearly ideal in design. A walking person requires 1.96, or say 2 sq.ft. of space. With this amount of space per individual, the crowding would be no greater than on the sidewalk of a very busy street.

Street Space Used by Buses

Now consider the question of buses. Eight buses are given in the table, two of which are used in London and the others in New York City. The most modern type of bus on the London General Omnibus Company's lines seats fifty-four passengers and occupies 3.24 sq.ft. of roadway space and 0.46 lin.ft. of stream-line space per seated passenger, comparing very favorably with the London County Council seventy-eight-seat tramway car. The single-deck London bus, No. 10, developed for street service, but not yet in general use, seats sixty passengers and occupies 3.91 sq.ft. of roadway space and 0.56 ft. of linear space per seated passenger.

The best types of buses in use in New York City do not compare unfavorably with the English buses. The most efficient utilizer of street space among the buses is the Leindorf bus, No. 16 in the table, which occupies 3.28 sq.ft. of roadway space and 0.41 lin.ft. of traffic stream-line space per seated passenger. The same corporation, I understand, is developing a seventy-seat bus, but its dimensions are not now available. The fifty-one-seat bus of the Fifth Avenue Coach Company also compares favorably with the English types. It occupies only 3.5 sq.ft. of roadway space and 0.48 ft. of linear space per seated passenger. The extravagant users of street space among the buses are the miscellaneous buses used on the city's bus lines, taking as high as 7.4 ft. of road space and 0.99 lin.ft. per seated passenger (see Mack bus, No. 13 in the table). Such a bus uses 2.38 times as much stream-line space as the London seventy-eight-seat car. Comparing it with the best bus type the corresponding figures are 2.28 and 2.15 times greater respectively.

The above comparisons are all on a seat basis, for the reason that abroad a relatively small number of passengers are permitted to stand, even during the rush hours, whereas with us the cars are designed to carry the maximum number of standing passengers during the rush hours. If 100 per cent overloads are considered as a maximum on the cars, and 50 per cent overloads as a maximum on the buses, the comparable figures would be somewhat different. Comparing the London County Council car with the new Peter Witt car for Brooklyn, and assuming 100 per cent overloads on the Peter Witt car, the figures would become for the London car 3.11 sq.ft. occupied per seated passenger as

*Abstracted from a report on European conditions presented to the Transit Commission May 9. The report also compared transit conditions in Liverpool, Glasgow, and Edinburgh, and an abstract of this portion of the report will appear in an early issue of this paper. For earlier reports on European conditions by Mr. Turner see issues of this paper for Jan. 13 and Jan. 27, 1923.

COMPARATIVE USE OF STREET SPACE BY VARIOUS TYPES OF BUSES AND SURFACE CARS

SURFACE CARS

No.	Type	Length Ft.	Length In.	Width Ft.	Width In.	Height Above Top of Rail Ft.	Height Above Top of Rail In.	Seats*	Area Sq.Ft.	Sq.Ft. per Seat	Sq.Ft. per Pass. 100 Per Cent Overload	Lin.Ft. per Seat	Lin.Ft. per Pass. 100 Per Cent Overload
1	Liverpool double-deck	30	2	7	4	..	...	64 { 42 up C 22 low L	221.18	3.46	....	0.47	....
2	Glasgow double-deck	30	0	7	2	16	1	62 { 38 up C 24 low L	215.10	3.47	....	0.48	....
3	London County Council double-deck	33	10	7	2	16	0	78 { 44 up C 34 low L	242.50	3.11	....	0.43	....
4	Third Ave. cross-seat	43	0	8	3½	..	...	48	356.47	7.43	3.72	0.90	0.45
5	One-man	22	4	7	8	..	...	30	171.27	5.71	2.86	0.74	0.37
6	Brooklyn center-entrance	45	8	8	5½	11	0½	59	384.48	6.63	3.32	0.79	0.39
7	Brooklyn new Peter Witt	44	6	8	0	10	6	47	356.00	7.57	3.79	0.94	0.47
8	New York Rys. double-deck	44	0	8	3	12	11½	79 { 38 up L 41 low C	363.00	4.60	2.30	0.56	0.28

BUSES

No.	Type	Length Ft.	Length In.	Width Ft.	Width In.	Height Ft.	Height In.	Seats*	Area Sq.Ft.	Sq.Ft. per Seat	Sq.Ft. per Pass. 50 Per Cent Overload	Lin.Ft. per Seat	Lin.Ft. per Pass. 50 Per Cent Overload
9	London General Omnibus Co. double-deck bus	24	8½	7	1	12	3½	54 { 28 up C 26 low C	174.95	3.24	....	0.46	....
10	London Special single-deck bus. (Hickman Body Co.)	33	6	7	0	..	...	60	234.50	3.91	....	0.56	....
11	Municipal (N. Y. C.)	26	0	7	4	..	...	30	190.58	6.35	4.14	0.87	0.44
12	White bus	23	4	7	3	..	...	30	169.10	5.70	3.80	0.78	0.52
13	Mack bus	19	10	7	5	..	...	20	147.10	7.40	5.00	0.99	0.66
14	Stewart bus	15	4	6	7	..	...	17	101.00	6.00	4.00	0.90	0.60
15	Fifth Avenue double-deck bus	24	4½	7	4	13	6	51	178.78	3.50	....	0.48	....
16	Leindorf double-deck bus	25	0	8	0	..	...	61	200.00	3.28	2.19	0.41	0.27

MISCELLANEOUS

No.	Type	Length	Width	Height	Seats	Area Sq. Ft.	Sq. Ft. per Seat	Sq. Ft. per Pass. with Two Pass.	Lin. Ft. per Seat	Lin. Ft. per Pass. with Two Pass.
17	Packard touring	16 8	5 6	.. ...	7	90.3	12.9	45.1	2.38	8.33
18	Cadillac touring	16 0	5 7	.. ...	7	89.3	12.8	44.7	2.27	8.00
19	Ford touring	11 8	5 8	.. ...	5	66.1	13.2	33.0	2.33	5.83
						Averages	12.97	40.9	2.49	7.36
20	Yellow taxi	14 6	5 6	.. ...	5	79.8	15.9	39.9	2.90	7.25

Note 1.58 sq.ft. per standing person—crowded, but one can move through crowd.
1.96 sq.ft. per standing person—crowding no greater than on a sidewalk of a busy street.

*C, cross seats; L, longitudinal seats.

compared with 3.79 sq.ft. for the Peter Witt car, and 0.43 lin.ft. per seated passenger as compared with 0.47 lin.ft. per seated and standing passenger. In the case of the buses the corresponding figures 3.24 and 0.46 of the London General Omnibus type would be comparable with 2.19 and 0.27 respectively for the Leindorf bus. The Fifth Avenue bus figures would remain as 3.50 and 0.48 respectively, because no standing passengers are permitted.

Regulations in Great Britain require the minimum number of standing passengers, even during the rush hours, so the vehicles have been designed to carry the maximum number of seated passengers, which in turn has resulted in a type of vehicle that will utilize the minimum roadway space per passenger. With us, the policy of carrying standing passengers to the limit has resulted in a type of vehicle most extravagant in the use of street space. It seems to me that it is about time to change this policy and compel the production of a type of car that will utilize the roadway space more economically, such as the New York Railways double-deck car. Our best types of double-deck buses should be adhered to and developed for use in congestion, while the single-deck type should not be used under such conditions.

Consider other types of passenger vehicles using the streets, touring cars and taxicabs, for example, No. 17 to No. 20 in the table. On the average the touring cars occupy about 13 sq.ft. of roadway space per seated passenger, if we assume the cars to carry full loads, and approximately 2½ lin.ft. per passenger on the same assumption. But these vehicles are rarely fully loaded, and it is doubtful if their loads would average two passengers, certainly not more than three. On a two-passenger basis such cars would occupy 41 sq.ft. of roadway space per passenger, and on a three-passenger basis 27 sq.ft. per passenger, or these vehicles take up in our congested streets from nine to thirteen times as much roadway space as the most economical street car. It is such extravagant users of our streets that cause our most difficult traffic conditions.

The taxicab is worst of all, occupying approximately 16 sq.ft. of roadway space per passenger, assuming a full load of five passengers, and nearly 3 lin.ft. per passenger. The average load of a taxicab is probably not far from two, on which basis it would occupy about 40 sq.ft. per passenger, or thirteen times as much space as the most economically-designed passenger vehicle would occupy. The answer seems to be that one of the cures for our street traffic ills is to reduce the number of taxicabs and touring cars to a minimum and provide the most economical space-using type of passenger vehicle instead—double-deck cars and buses.

This study means that passengers in a touring car or taxicab are occupying the roadway space that ought to be available for the transportation of twenty-six passengers instead of two. Is there any wonder that our principal streets are congested when there are such a vast number of these two-passenger vehicles in use?

It is my judgment that a completely articulated system of uptown and downtown and crosstown 10-cent fare, seat service buses would be welcomed by a large number of people who now use touring cars, taxicabs, trolleys and rapid transit lines from necessity rather than from choice. This would take many of the extravagant space-using vehicles off the streets. In turn, by reducing the interference to surface cars, the latter would be able to provide 5-cent fare service in the interests of the people who desire to use them, or could not afford to use the 10-cent fare service. By these means, with a more extensive luxury bus service and a greatly improved surface car service resulting therefrom, everybody would be happier with their transit facilities.

New Cars for North Shore Branch Line

Reduced Weight, Low-Floor Height, Inclosed Vestibule Both Front and Rear, Are Features of New Cars for Libertyville Branch

EMBODYING many features characteristic of the latest practices in car design, the new cars recently placed in service on the Libertyville branch of the Chicago, North Shore & Milwaukee Railroad meet satisfactorily the requirements for this class of service.

The new cars are of the standard, double-truck, four-motor, curved side type, manufactured by the Cincinnati Car Company. They have a total weight of 40,000 lb., which compares with 70,000 lb. for the interurban cars replaced on this branch. The interior resembles that of the heavy North Shore cars in the Chicago-Milwaukee service. The car is divided into two sections with a toilet located on one side of the car at the dividing partition. Seats of the reversible cross-seat type, manufactured by Hale & Kilburn, of full spring construction, covered with the conventional North Shore green plush, are used in the main section of the car, while the same type, covered with a high grade of Fabrikoid, are used in the smoking compartment. Electric heating is used with thermostatic control provided by the Railway Utility Company, while Garland ventilators are used in order to insure the proper circulation of air.

A two-step entrance is made possible by the use of 26-in. wheels and a low clearance truck of the arch bar type with combination elliptic and coil spring construction. The trucks have a wheelbase of 5 ft. 4 in., and are each equipped with two 40-hp. motors and Smith-Ward automatic slack adjusters. The principal dimensions of the North Shore car are as follows:

Over-all length	47 ft. 2 in.
Length of platform	4 ft. 4 in.
Door opening	36 in.
Truck centers	28 ft. 6 in.
Width of aisle	22 in.
Width of seat	37 in.
Rail to first step	16½ in.
First step to platform	14 in.
Seating capacity	52



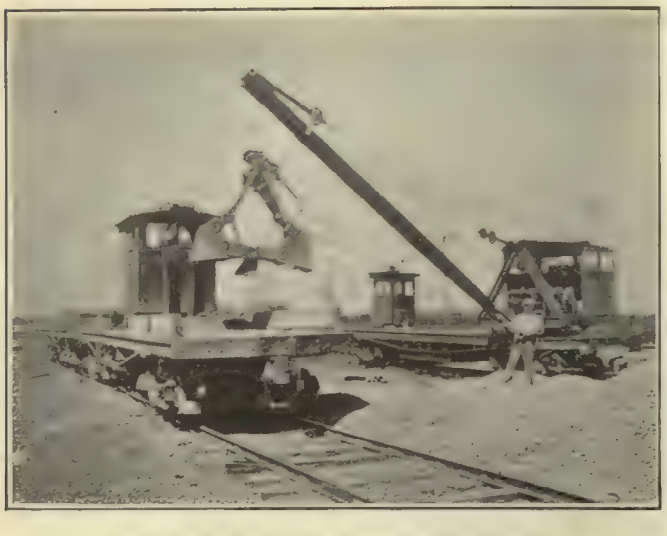
Two Compartments, Fabrikoid and Green Plush Seats, Center Toilet, No Bulkheads and Platform Floors Flush with Body Floor

From the above it will be noted that the platforms are rather small, but this has been taken care of by the omission of bulkheads, thus making the car interior and platform one continuous compartment. The car has been designed for double-end, two-man operation. It is equipped with VanDorn automatic couplers and HL multiple-unit control for train operation. The car is not intended for one-man operation nor is it equipped with safety appliances.

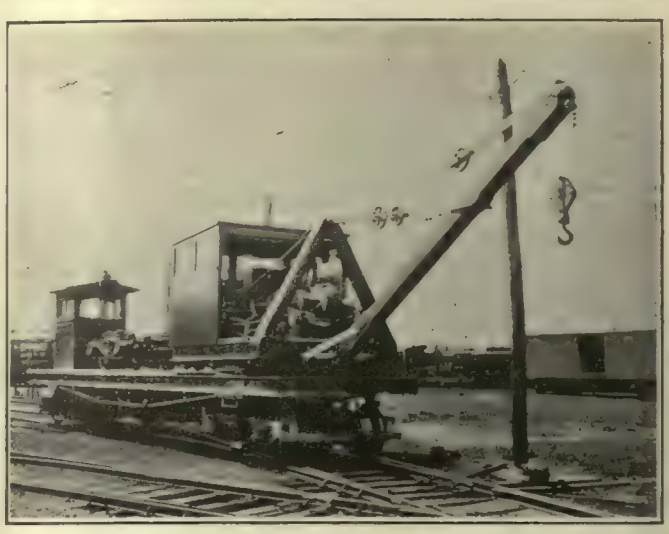
The Libertyville branch, as it is known, connects the town of Area with the main line of the Chicago, North Shore & Milwaukee Railroad at Lake Bluff, passing through the towns of Libertyville and Roundout en route. Service is maintained on a thirty-minute headway, it requiring twenty minutes to make the run. Co-ordination of the schedules makes it possible to connect with the through trains for Chicago or Milwaukee at Lake Bluff. In this distance of 8.6 miles



40,000-Lb., 47-Ft., Fifty-two-Passenger Car for Branch Line Service



The Clamshell Is Used with the Long Boom



The Short Boom Has a 10-Ton Lifting Capacity

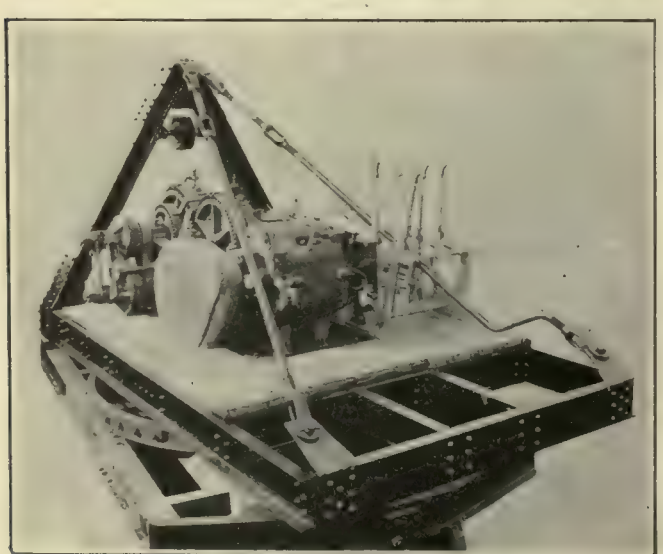
there are seventeen station stops. A schedule speed of 25 m.p.h. with a maximum speed of 40 m.p.h.. is provided.

There has been no change in service with the installation of the new cars, the only saving incurred by the investment being the saving in power and perhaps in maintenance. To provide patrons with an up-to-date, high-grade new car has been the main object of the company in making this installation.

Crane Car Has Interchangeable Hoisting Booms

Heavy Framework Is Feature of Crane Car Built by Buffalo & Lake Erie Traction Company— Attachments Add to Its Utility

SEVERAL departures from customary practice are embodied in the design of a crane car which has been built at the East Twelfth Street shops, Buffalo & Lake Erie Traction Company, Erie, Pa. This car is equipped with two wooden booms which are interchangeable, the shorter being 18 ft. in length and the longer one 35 ft. Both booms have the same general 12-in. x 12-in. cross-section, but the 18-ft. boom is made of long-leaf yellow pine, whereas the longer is of spruce.



The Carriage for the Crane-Operating Mechanism Is Made of 8-In. I-Beams

The car, which is 45 ft. long, has a frame of 10-in. I-beams with 8-in. intermediate sills. Archbar trucks with a 6-ft. 6-in. wheelbase were built at the company's own shop. Four GE-204 motors are used with K-34 control. The carriage for the crane-operating mechanism is composed of 8-in. I-beams and channels, with an A-frame at one end, as shown in an accompanying illustration.

The hoisting mechanism consists of a K-12 controller and one GE-80 motor geared to a drum. On the rear of the carriage is a counterweight of 8,000 lb. With the 18-ft. boom at an angle of 60 deg. the lifting capacity of the crane is about 10 tons. A clamshell of ½ cu.yd. capacity and a bucket of the same size for handling brick add greatly to the utility of the crane. The cost of construction was approximately $8,000, including labor and material. All second-hand material used was charged at market prices.

Reading Transit's Carsonia Park Rehabilitated

THE Reading Transit & Light Company, Reading, Pa., owns Carsonia Park, a popular summer amusement and picnic resort near the city, reached by the company's city lines. The company has newly leased the park site and has made preparations for handling a large increase in traffic this season. That this expectation is reasonable is indicated by the fact that on Sunday, May 6, the park attendance was greater than on any previous day, despite the fact that the regular amusement season had not yet begun. The company has refitted thirty summer cars in addition to its regular service and has built new stations and tracks at the park.

The Metropolitan Edison Company, which supplies power to the park and railway, has erected a fireproof substation near the park, 31 x 99 ft. in size. This will normally be fed by a 66,000-volt transmission line from the West Reading power plant of the Edison company, but will have other power connections to safeguard it against interruptions to service. This substation will also supply power to the communities of Mount Penn, Pennside, Stony Creek, Reisston, Jacksonwald and St. Lawrence.

Engineer Recommends Enlarging Platforms to Permit Double Doors—Would Equip Present Single-Truck Cars with Air Brakes and Safety Devices and Operate with One Man—Principal Objection to Them Is Overcrowding—Rescheduling Would Decrease Standees 60 per Cent—Various Ways of Improving the Service Are Suggested

Proposed Service Improvements in New Orleans

IMPROVEMENTS in service are considered in Section 4 of the report by John A. Beeler, for the city of New Orleans, on the local transportation situation. The section deals first with equipment. It is shown that two types of equipment are in general use here. These comprise 320 large double-truck cars averaging fifty seats, 330 smaller single-truck cars averaging thirty seats and forty-two trailers averaging sixty seats. Of the 320 large double-truck cars 100 are new and are equipped with double folding doors at both front and rear, affording quick loading and unloading facilities. The engineer comments that the doors of the other cars should be similarly arranged as rapidly as possible.

In connection with the small cars, the report states that much prejudice exists against these due to the high steps and narrow entrances and exits, but mainly because of heavy overloading. Checks and counts made show that during periods of heavy traffic loads of ninety to one hundred passengers were frequently encountered, where half as many would have made a full load. The arrangement of entrances and exits is bad. The platforms should be extended and lowered and the door capacity increased to permit flow in and out simultaneously. Equipped with air brakes, automatic door control and with modern automatic safety devices, an efficient one-man safety car would result. The outlay would be about one-fourth of what new safety cars would cost.

This type of car, rightly used in its proper sphere, would be a great advantage to the service. Trainmen need have no fear of losing their positions, as the engineer comments he has yet to find a single instance where safety cars have been used that it was necessary to discharge trainmen from the service. In fact, they will probably benefit, as operators of the one-man type car are usually paid a higher wage.

Of the trailers, the report states that those now in use are an obsolete type and should be replaced with modern cars at the earliest possible date. There are excellent opportunities on the heaviest lines where the street traffic is heavy for the employment of lightweight, inclosed type modern trailers, seating sixty to sixty-five. Their use will more nearly assure seats for all passengers than any other practical method. They will reduce maintenance costs, power consumption and accidents.

It is suggested that, with its climatic conditions, New Orleans is an ideal place to use double-deck trailers. In fact, with the wide gage, a low-hung type with inclosed upper deck is feasible. Such an arrangement would make possible a seating capacity of 100 to 125 per car, which would forever put at rest the seat question on all lines where trailers could be used.

Trailers are proposed for use on the St. Charles, Tulane-St. Claude and Canal Street lines. Seventy-five modern trailers would relieve an equal number of motor cars seating fifty-two passengers and at the same time increase appreciably the seats furnished. A trailer car-hour will cost to operate about $1.25 per hour less than for a motor car. This item alone would make a saving of $300 a day on these three lines.

The report also recommends a redistribution of equipment among the various lines in order to place each type of car in service under traffic conditions where it will most nearly provide the ideal service. The larger cars are specified for use where a combination of both good frequency and capacity is required. The small cars with their light weight and quicker acceleration are specified for use where the traffic is lighter, but where the frequent headway possible with their use will induce travel and reduce overcrowding. By this plan the headways will be, in general, increased on all of the important routes.

TABLE I—PRESENT AND PROPOSED SERVICE STANDARDS IN NEW ORLEANS

Cars	Car-Miles		Seat-Miles		Car-Hours		Car-Miles per Car-Hour	
	Present	Proposed	Present	Proposed	Present	Proposed	Present	Proposed
Large...	19,562	28,814	999,352	1,498,328	2,158	2,864	9.06	10.06
Small...	24,977	14,588	720,780	437,640	2,767	1,498	9.02	9.75
All.....	44,539	43,402	1,720,132	1,935,968	4,925	4,362	9.04	9.96

Similarly, schedules are to be improved through the straightening of routes, elimination of unnecessary stops, reduction of congestion and by taking slack out of present schedules, which are considered to be too slow. The report states that cars now run normally for a distance, then slow down to a crawl until a time point is reached, then resume the normal free running speed for a while. This extreme irregularity in running speed is most annoying to patrons and has been known to stimulate the purchase of flivvers by those who should be paying carfare. Layover time is not now generally provided at line terminals, the running time having been made slow enough to cover this. It would be better to make the running time faster and put the slack absolutely required in the layover.

Another feature that should not be overlooked is that when the interval between cars exceeds five minutes some even division of the hour should be used, thus making it easier for the rider to know when to expect

TABLE II—CARS REQUIRED TO GIVE PRESENT AND PROPOSED SERVICE

	Large Cars		Small Cars		All Cars	
	Present	Proposed	Present	Proposed	Present	Proposed
A.m. rush period.....	163	220	212	111	375	331
Non-rush period.....	98	130	119	69	217	199
P.m. rush period.....	186	270	248	121	434	391
Early night period.....	95	123	134	68	229	191
After 8:30 p.m.....	68	98	97	56	165	154

a car. With a five- or ten-minute headway cars will be scheduled to arrive at a certain point at equal intervals of the hour, while with a nine- or eleven-minute service there is no way for patrons to tell when to expect a car. Where two or more lines with infrequent headways operate on joint tracks it is desirable, when practicable, to effect a combination of the different headways to prevent the bunching of cars.

According to the proposed scheduling of cars, the average loading of the large cars in the maximum a.m. hour would be decreased from sixty-five, at present, to fifty-nine; in the maximum p.m. hour, from seventy-one, at present, to sixty-three. For the small cars the average loading would be decreased in the maximum a.m. hour from forty-three, at present, to twenty-nine, and for the maximum p.m. hour, from forty-five to thirty-two. The basis for estimating service required during the non-rush hours was to provide a seat for every passenger at the maximum point on the line, based on half-hour averages. Largely increased seating facilities were then proposed for the rush hours. On the basis of these recommendations, the report shows that the number of passengers per seat for the maximum a.m. hour would be decreased from 1.3 to 1.2, for the maximum p.m. rush hour from 1.4 to 1.2, on lines where the large cars are used, and on lines on which the small cars are used from 1.5 to 1.0 in the maximum a.m. hour and from 1.6 to 1.1 in the maximum p.m. hour. The average seating for all cars would be improved from 1.4, at present, to 1.1 passengers per seat in the maximum a.m. hour, and from 1.5 to 1.2 in the maximum p.m. hour. The proposed arrangement gives 21 per cent greater seating capacity, or, to put it another way, lowers the maximum number of standees 60 per cent in the evening and 75 per cent in the morning.

The report comments that it is easy to see why there is prejudice in the mind of the car rider against the small car. With its narrow doors and restricted platforms, it nevertheless shows under present conditions an average loading over seating capacity of 60 per cent during the maximum hour. On the other hand, the large car, with its wider aisles, double doors and more commodious platforms, shows only 40 per cent overloading. Is there any wonder, then, that patrons throughout the city express the preference for the large cars, without giving thought to the frequency of headways? With the small car modernized and operated as proposed, better service will result than is economically possible with the larger type. The betterment in the loading and the more effective use of the equipment are demonstrated by the figures given showing a comparison in present and proposed loading.

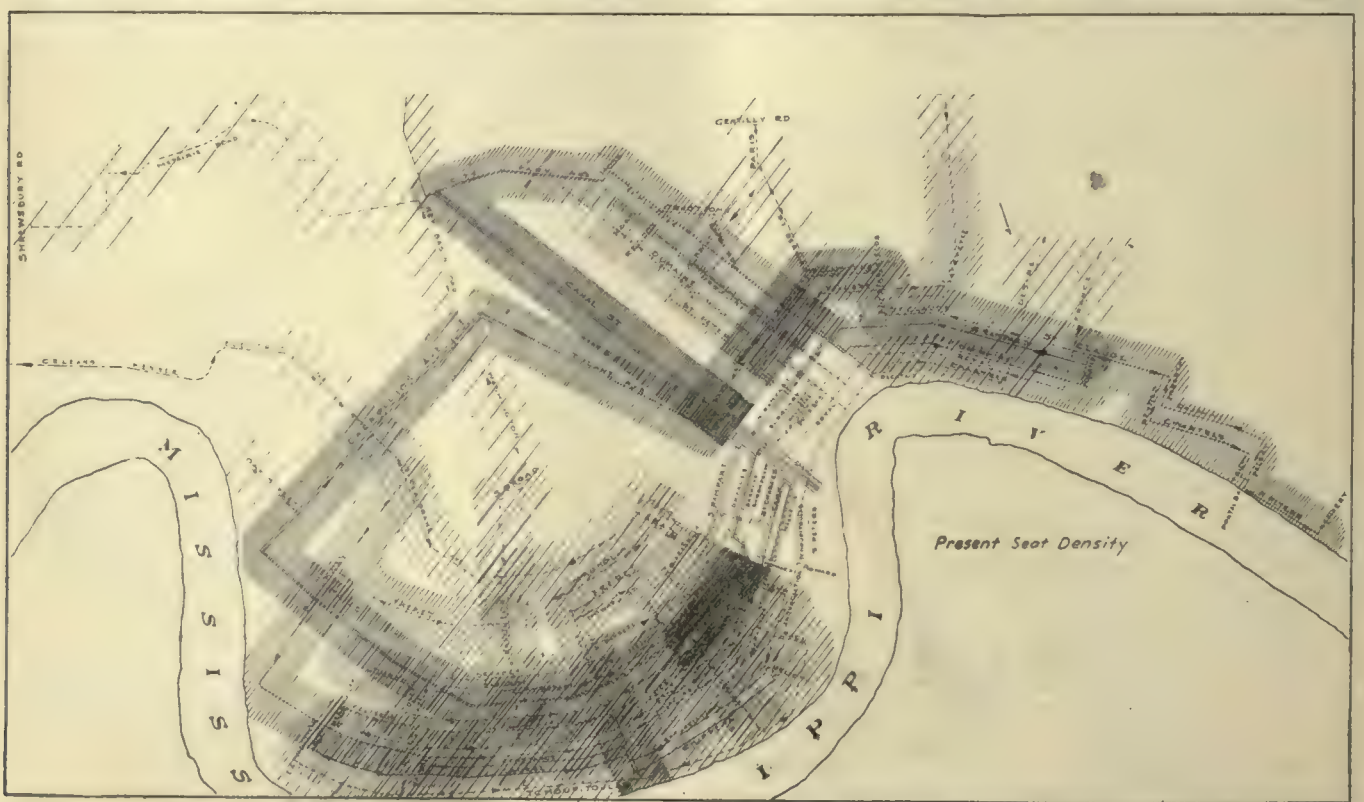
A summary of the present and proposed service as indicated by car-miles, seat-miles, car-hours and car-miles per car-hour is given in Table I. The car requirements to provide this service are summarized in Table II.

In giving the proposed service with 563 less car-hours, as shown in Table I, than required by the present plan, a good idea of the importance of the relation of proper routing to the transportation problem is obtained. With the estimated saving of $2 per hour, expenses can be reduced $1,126 per day, while the service is actually extended and improved.

General Operating Improvements

Under this heading the report states that there are many factors the adoption of which will bring marked advantages to the service. It is pointed out that all of these except the first one discussed are wholly within managerial control.

Passenger Stopping Places.—Distance from the business section is not by any means the only factor that determines the time necessary to reach it. The number of stops made is the factor that does more to limit the capacity and reduce the quality of service than any other one thing. Almost any district can be brought relatively closer by a reduction in the number of stops.



Seat Density on New Orleans Street Railway Under Present and Proposed Service and Routing Plans. As Drawn, Each

In New Orleans the stopping places average fourteen to the mile. This is entirely too many for good results. An average spacing of 660 ft., or eight stops to the mile, is standard practice in the larger cities where good surface car facilities exist.

It is pointed out that even in making eight stops to the mile the running speed of a car is reduced 50 per cent. In other words, one-half of the time is consumed in making the stops. It means a complete stop every forty-five seconds when making a speed of 10 miles an hour, and it is necessary to make practically all of the stops during the rush hours. With the big cars stops should never be closer than eight to the mile. With the smaller and lighter cars it is not quite so important.

Designation of Stops.—The location of every stopping place should be plainly indicated. Loading platforms are self-indicating. At other points, however, the stops should be designated by painting a white or light yellow band, a yard wide, around the trolley pole about 7 ft. above the ground. These can be seen farther at all times than lettered boards.

Destination Signs.—The general practice in New Orleans is to display a route sign regardless of direction or destination. This may be right for short local runs, short cross-town lines, shuttles, etc. Some of the through city lines, like Jackson-Claiborne, carry two route designations, one on each end of the car. When the car is headed toward North Claiborne Avenue the front of the car reads N. Claiborne, while on the rear it reads Jackson Avenue. It is not at all clear to those unfamiliar with the city or the car routing. A person desiring to go toward Jackson Avenue sees a car passing designated Jackson Avenue, and should he board it he would be informed it was bound toward Claiborne; properly, this route sign should read "Jackson-N. Claiborne," and the supplementary destination sign displayed in conjunction with it should clearly show the direction of the trip.

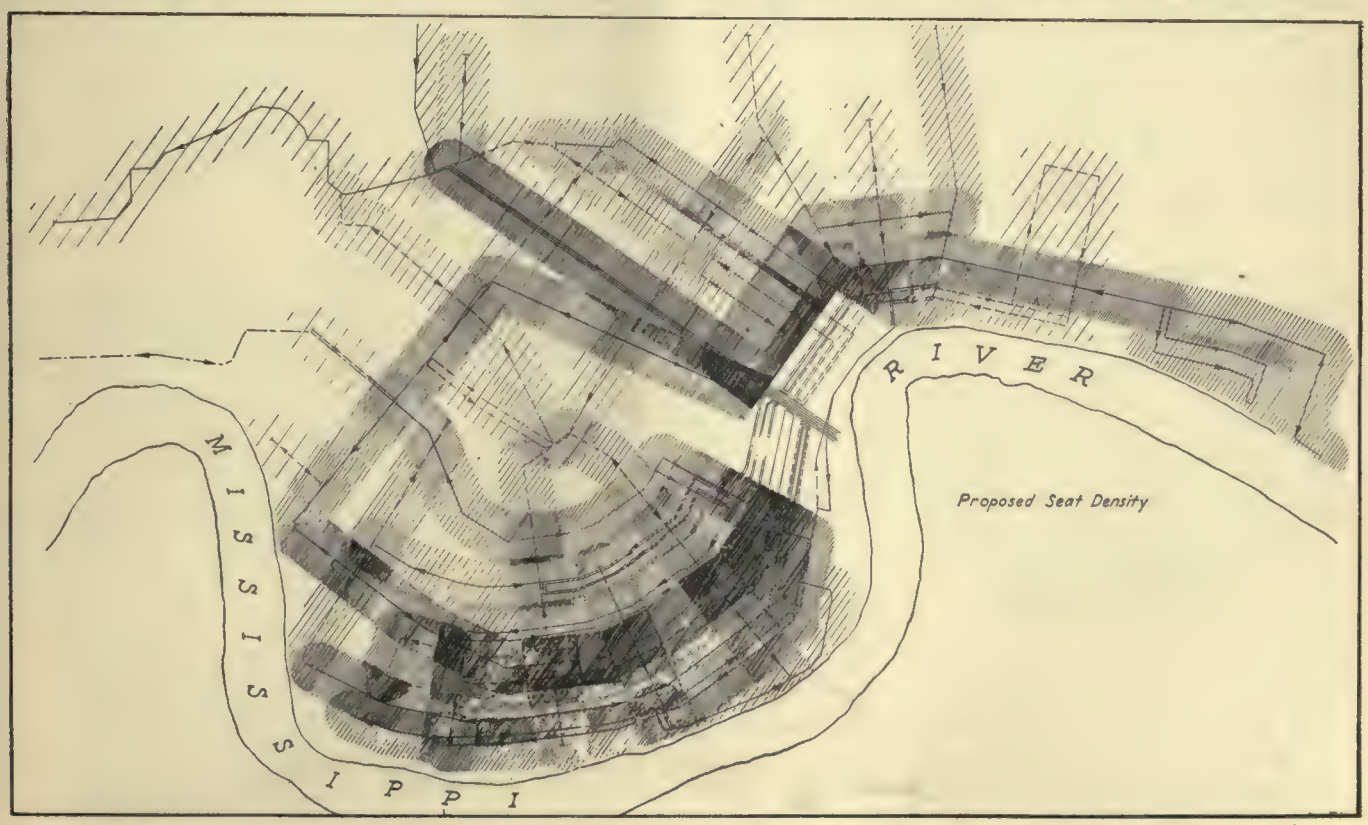
Similarly, inbound St. Charles Avenue cars now carry a sign reading "Tulane Belt." These cars reach Tulane after a while, but first go to Canal Street, then down to the Wells Street Loop, where they turn again, proceed along Canal to Rampart, and finally to Tulane. Under the proposed plan the St. Charles cars would display at all times the St. Charles route sign, together with the destination sign reading "Canal" when inbound and "Carrollton" when outbound. The engineer recommends that all destination signs be of the illuminated type.

Double Berthing.—Double berthing, or loading of cars in pairs, should be employed at all important stops included within the congested district, and wherever loading platforms are provided. The first car to approach the stop should always take the forward position. When a second car arrives while the first is still standing, it should invariably take the second place, and when it goes forward after taking on and discharging passengers, it should proceed without stopping at the forward position.

Street Collectors.—There is no one thing that pays better dividends than the employment of a live bunch of energetic young men to assume the duties of conductors at the front end of cars at congested points during the period of heavy traffic. Service is speeded up, the loading equalized, delays reduced and the strain on the line relieved when it is ordinarily greatest. The result can be measured in the good-will engendered by this added convenience and courtesy extended the public.

In New Orleans the plan would be especially applicable. To a large extent it would segregate the present mixed loading. This would be gratifying, especially to women and children.

Trackwork.—Generally speaking, the new trackwork is of an excellent type, but the cost is high. This is largely due to the fact that the equipment and facilities available for such work are inadequate. There is



Line per Inch Represents Fifty Seats per Maximum Rush Hour. Areas Were Shaded 1,000 Ft. Each Side of Tracks

too much done by "main strength and awkwardness," and too little by modern labor-saving machinery. Material and supplies are scattered in widely separated storage yards. Proper care of it is as difficult as getting it to the job is costly. Unless the department is given better equipment, rapid and economical work of large proportions is out of the question.

Electric Track Switches.—There are many locations where these devices can be used to the great improvement of the service. Their use at all regular points of track divergence where car movements are frequent is most desirable.

Power Saving.—While the power charges covering railway operation, as evidenced by the company's statement, are low, it is apparent to a close observer that the energy consumption is far from economical. Brakes are applied before the current is shut off and cars started before the brakes are released. Little or no effort to coast is evident. Level tracks, such as those in New Orleans, particularly lend themselves to coasting.

All cars should be equipped with some type of modern power-saving device. Its application and proper use will not only save power, but the cost of maintenance of both electrical and mechanical equipment will be reduced. Minimizing power consumption with a given schedule requires uniform acceleration and a minimum of braking at a uniform rate. Smoother operation results, the operator has better control of his car and accidents are reduced. A safe estimate would be that from 10 to 15 per cent of the power now used could be saved.

The company has been making considerable expenditures in adding needed power facilities. It should not overlook the field of power conservation. One-quarter of a cent a mile is a conservative estimate of the saving possible. This will amount to $108.50 per day.

One-Man Operation.—The application of the one-man principle of operation should be made on all the small cars as soon as they can be remodeled and the safety and automatic features installed. There are scheduled in the proposed plan 1,498 small car hours per day. A saving of 50 cents per hour would reduce operating expenses $749 daily.

There is no valid reason why the extension of the one-man principle cannot be made to include certain of the lines using the larger cars, for after all it is simply the utilization of labor-saving devices to reduce the hardship of manual labor and improve the skill and capacity of the trainmen. With cars equipped with a full line of automatic labor-saving and safety devices and with the assistance of street collectors at heavy loading points an operator should not have any more to do than at present. In fact, it would be easier, cleaner and nicer work.

The report then lays particular emphasis on the importance of enlisting the support and co-operation of employees and suggests the adoption of a co-operative plan along the lines successfully employed in a number of cities. Some suggestions are also made as to how patrons can help in speeding up and improving the service.

Carrying Safety to the Public—V*

An Important Factor in an Organized Safety Campaign Is a School for Drivers of Commercial Vehicles—It Brings Realization that They Must Co-operate

By C. W. Price
Vice-President in Charge of Public Safety, Elliott Service Company, New York City

DURING the past four years schools for drivers of commercial vehicles have been conducted in a number of large cities, including Chicago, Detroit, Milwaukee and St. Louis, and always with a large attendance and far-reaching results.

Except through a general educational campaign, it is difficult to reach owners and drivers of private cars with any direct service, but it is possible to gather large numbers of drivers of commercial vehicles into a school for group instruction. These are the men who, in proportion to their numbers, are the largest users of the streets. If they can be interested, they are, therefore, in a position to do much to reduce the hazards.

To secure a large attendance at the school the following plan has proved most successful: A complete list of owners of commercial vehicles is obtained and a strong letter is sent to each, outlining the plan and purpose of

*Fifth of a series of ten articles.



Posters of Attractive Design Emphasize Some of the Common Hazards



Posters of this Type Were Used in Connection with the Instruction Work of the Drivers' School

the school, and emphasizing the direct service which the school will render to employers of drivers, computed in dollars and cents. The employers are asked personally to urge their drivers to attend, and they are requested to send in lists of the drivers who have promised to do so. A few days before the opening of the school the members of the drivers' school committee reach by telephone all employees who have not responded.

The course of study in the school includes twelve lessons. Each lesson is divided into two parts, one of which covers points of mechanical safety, while the other deals with traffic laws and the rules of safe driving. Each driver is furnished with a set of twelve printed lesson outlines.

In order to maintain interest in the school and to get the best results from the lessons it is important to have a director who is able to lead and enthuse the drivers. He should know traffic safety and should be able to direct the general discussion which should be made a prominent feature of each session.

The sessions of the school are usually held on a stated night each week and each week's topic is presented by a different speaker. The speakers on mechanical safety are selected from among mechanical experts in garages, superintendents of garages and teachers in automobile schools. Traffic policemen, judges of traffic courts, safety engineers and employers of drivers can usually be induced to present the lessons on traffic laws and the rules of safe driving.

The continued attendance of the drivers throughout the course and the permanent results accomplished in convincing the drivers will depend on securing speakers who not only know their subjects but, what is more important, know how to present each one in a simple and convincing manner. In many of the schools the drivers sing one or two of the old war songs at the opening of the school. This always is done with good effect. Motion pictures and lantern slides are used to illustrate the lessons and to furnish entertainment.

At the last session of the school an attractively engraved diploma is presented to each driver who has attended at least nine of the twelve lessons. It is customary to make the occasion as impressive as possible by having one or two prominent speakers at this session.

In the various drivers' schools which have been conducted it has been found that the drivers go out of these schools not only informed regarding the mechanical safety of their machines and the rules of safe driving but, of far greater import, they go out with a changed attitude, with a new sense of their obligation to help make the streets safe, with a new thought about the traffic policeman and their relationship to him. They have come to see that the traffic judge and the traffic policeman are their friends and are doing their duty in trying to safeguard every driver.

In several cities a school for women drivers has been conducted with gratifying success. The course is usually limited to six lessons, and the sessions are held in the afternoon. In one city, at the close of the school, a tournament was held in the local armory. One of the features of the program was a contest of the drivers in handling their own cars. The sales agents of various popular makes of automobile had on exhibition the chassis of their cars, thus enabling each woman to get first-hand information regarding the mechanical points of her car.

SAFE DRIVERS' CLUBS ORGANIZED

In this chapter mention should also be made of the safe drivers' clubs which have been organized in several cities. While these clubs are usually organized with the primary object of raising money, they may be made to serve in stimulating interest in safety. The members are secured through mail solicitation, letters being sent to a complete list, or to a selected list of owners of cars. The membership fee is usually one dollar. Every member receives a membership card and an emblem for his car. The one appeal which seems to win membership is that each driver of an automobile should be willing to do his "bit" by paying one dollar to help make the streets safe for him and his family.

In Milwaukee the club is governed by an executive committee consisting of superintendents in charge of motor vehicles. This committee did effective work in building up the membership of the club, had supervision of the school for drivers, issued monthly bulletins to the club members and took an active part in promoting traffic safety.

Illinois Utilities and Colleges Co-operate

University of Illinois and Northwestern University Prepare Plans for Instruction Specially Adapted to the Needs of Utilities

SEVERAL utility associations in Illinois have formed a joint committee to co-operate with the colleges of commerce and business administration of the schools in the state and in such ways as will insure to the industry a supply of young men versed in the administrative subjects which are peculiar to the public utility business, and likewise insure to the student an opening in the field for which he has been prepared.

A suitable curriculum has been planned by two of the large universities, through co-operation between the deans of their colleges of commerce and business administration and the utility committee. A study of the requirements was made with a view to incorporating in the regular commerce course those subjects which would familiarize the students with the problems confronting the public utility companies. It is not the desire to make an engineer of the student, yet he will be familiar with engineering to such an extent that he will be able to understand blueprints and the fundamental principles of mathematics. He will have what may be termed "descriptive engineering." His training will include also instruction in the relation of public-service corporations to the public, the various methods of regulation and control, public-utility valuation, rate-making, service, capitalization and financing. He will have a thorough knowledge of economies and business methods.

Following is the text of a letter which has been sent out by the joint committee to the utility companies in Illinois, which explains the plan:

Public-utility companies have long felt the need of men who have had special training in the economics, business administration and law governing the incorporation and operation of public utilities. Some companies have endeavored to impart this information to certain members of their supervisory force by means of lectures, or by encouraging individuals to take special courses in schools of commerce. It is just as essential to have young men especially trained along these lines entering the service of utilities as it is to have men trained in the various engineering fields, such as mechanical, civil or electrical. Definite co-operation between Illinois colleges and universities and public-utility companies of Illinois to bring about the desired results have been attained, largely due to the efforts of a joint committee representing the Illinois Electric Railways Association, the Illinois State Electric Association, the Illinois Gas Association, the Illinois Telephone Association, the Illinois Bell Telephone Company and the Illinois Committee on Public Utility Information.

Every phase of the utility industry and its interests has been given full and practical consideration. The plan contemplates curriculums in the colleges and universities—probably full college courses in the long run—which will tend to do two things of immense value to the industry, namely (1) educate regular classes of young men, especially for the public-utility industry, in all of its branches, much as they are now educated for agriculture, finance, journalism or the professions; and so increase the supply of college-made men so badly needed in the utility business; (2) establish instruction in the fundamentals of the utility business as an essential part of college courses in economics and the like, so that better understanding of the utility industry and its problems may permeate both instructing forces and student bodies.

At the University of Illinois and Northwestern University a start has been made in and along these lines in the college of commerce and business administration. Probably most of the higher educational institutions in the state, if not all, can be interested if we of the utility business do our part. And we have a very definite part to perform, as the students will not take this course on public utilities and the colleges and universities will not continue to teach it unless we absorb the young men into our organizations after they have completed the courses. We must assist in the operation of the plan in the following ways: (1) By helping to stimulate interest in the public-utility curriculum among those entering the colleges; (2) by giving summer vacation employment to as many as possible of the students who are taking subjects in the public-utility curriculum; (3) by employing the students of public-utility subjects when they are graduated and then seeing to it that they are assimilated and developed in our various organizations as examples of the opportunities for college men in the public-utility industry; (4) by utilizing college faculty members whenever possible for study, surveys, research or other work, for which they are especially fitted by their special knowledge and faculties.

Execution of the educational program sketched in the foregoing has been submitted to the following executive committee of five: B. I. Budd, Chicago Elevated Railroads, chairman; George R. Jones, Public Service Company, speakers' bureau, vice-chairman; R. V. Prather, secretary Illinois public utility associations; A. G. Mitchell, secretary Illinois Telephone Association; G. W. McRae, Illinois Bell Telephone Company, and H. A. Johnson, secretary.

This executive committee cannot do much without the co-operation of the public-utility companies. The co-operation. to be effective, should come through some one man in each company and that man should be the chief executive of the company or one reporting directly to the chief executive. You are hereby requested to designate the man in your company with whom we may pursue this matter systematically and in detail. We would also like to know how many students you will promise to employ for summer work each year and how many graduates from these courses you will take into your organization each year.

All who have sat in the joint committee sessions are convinced that we are inaugurating in this something of inestimable helpfulness to the utility industry. Your cordial support is, therefore, counted on.

PUBLIC UTILITIES CURRICULUM
COLLEGE OF COMMERCE,
UNIVERSITY OF ILLINOIS

First Year

Principles of Accounting; Survey of Modern Industries; Economic History of the United States; Rhetoric and Themes; Military Training and Gymnasium; Electives (Science, Mathematics or Languages).

Second Year

Intermediate Accounting; Principles of Economics; Economics of Money and Banking; American National Government; State and Local Government; Principles of Business Administration; Business Letter Writing; Military Training; Electives (Science, Mathematics, Language or the Social Sciences).

Third Year

Principles of Marketing; Business Law; Corporation Finance; Principles of Railroad Transportation; Freight Shipment; Municipal Governments; Constitutional Aspects of Social and Industrial Problems; Principles of Public Utilities; Public Utility Accounting; Free Electives.

Fourth Year

Principles of Public Finance; Labor Problems and Labor Organizations; Municipal Problems; Public Utility Finance; Law of Public Utilities; Regulation of Public Utilities; Problems of Special Utilities; Personnel Management.

PUBLIC UTILITIES CURRICULUM
SCHOOL OF COMMERCE
NORTHWESTERN UNIVERSITY

First Year

Economics
English II
Accounting I

Second Year

Corporation Finance
Investment Securities
Accounting II
Business Law I and II

Third Year

Required:
- Public Utilities
- Business Organization
- Marketing and Distribution

Elective (one elective required):
- Selling by Mail
- Office Management
- Government
- Sociology

Fourth Year

Required:
- Statistics and Statistical Methods

Elective (two electives required):
- Employment Management
- Money and Banking
- Resources and Trade
- General Psychology

Association News & Discussions

And There Arose a New King Which Knew Not Joseph*

Some Intensely Interesting and Practical Advice on Public Relations Work by the Man Famous for His Common Sense Editorials

BY BRUCE BARTON

WHAT I have to say will consist principally of two stories, which I think have a direct application to the utility business.

The first concerns a member of my profession, an advertising man, who was in the employ of a circus. It was his function to precede the circus into various communities and there to call at the newspaper offices and make sure that the notices would be flattering and to put on the fence posts and the barns pictures of the bearded lady and the man-eating snakes, and finally to get in touch with the proprietor of some store and contract with him for the space on either side of the elephant to be used for advertising purposes in the parade.

So, coming to a cross-roads town one time he found that there was only one store and the proprietor did not receive him enthusiastically. Said the proprietor, "Why should I advertise? I have been here for twenty years. There isn't a man, woman or child around these parts that does not know where I am and what I sell and how I do business." The advertising man answered very promptly, because in our business if we hesitate we are lost, and he said to the proprietor, pointing across the street, "What is that building over there?" The proprietor said to him, "That is the Methodist Episcopal Church." The advertising man said, "How long has that been there?" The proprietor said, "Oh, I don't know; seventy-five years probably." "And yet," said the advertising man, "And yet, they ring the church bell every Sunday morning."

My second story has also a religious flavor. It relates to a gentleman named Joseph, who is now deceased. Those of you who, like myself, were brought up on the Bible may have found some account of his very remarkable business career in that book. Those of you who have not read that book or who do not have it in your libraries may have heard of him through the works of Rudyard Kipling, because Mr. Kipling said of Joseph this, as you will remember: "Who shall doubt the secret hid under Cheops' pyramid was that the contractor did Cheops out of several millions, and that Joseph's sudden rise to controller of supplies was graft of monstrous size worked on Pharaoh's swarthy civilians."

But the account of Joseph in the Old Testament is much more complete and to his credit. You remember that he left his country under difficulties and, coming into a strange country, through his diligence and intelligence, he rose until he became the principal person in the state, second only to the King. Then there comes in that account, in that story, what I regard as one of the most amazing, one of the most staggering lines that has ever been written in a business history, a line that I think ought to be engraved deep on the office wall of every man who has anything to do with public relations, because with no interruption, no explanation, the account which has just finished telling of Joseph's remarkable career (and he reached a point where his public relations were widespread and where his private relations had all the good jobs in the Kingdom) goes on to say:

"And Pharaoh died, and there arose in Egypt a new King which knew not Joseph."

Now, gentlemen, I believe that that is the greatest sermon ever written on the subject of public relations.

When we gathered in this room this afternoon there were in this country in bed sick several thousand old men. It perhaps is indelicate for me to refer to that fact, but it is a fact, and we are grown up and we have got to face these things. On these old men you gentlemen collectively have spent a considerable amount of time and a considerable amount of money. It is to be supposed that you have made some impression upon them regarding your service and your purposes and your necessities. And in this interval while we have been sitting here those old men have died and all your time and all your money and whatever you have built up in the way of good-will in their minds—all those things have passed out with them.

In the same interval, in the same half hour, there have been born in this country several thousand lusty boys and girls to whom you gentlemen mean no more than the Einstein theory. They do not know the difference between a Mazda lamp and a stick of Wrigley's chewing gum. Nobody has ever told them that "Ivory soap floats" or that children cry for Castoria, or what sort of soap you ought to use if you want to have a skin that people would like to touch. Nobody has ever told them any of the other facts that are so vital in maintaining existence in these complex modern times.

The whole job of giving to them all the things that they are going to need in order to be able to form an intelligent public opinion and to exercise an intelligent influence in the community has to be started from the beginning and done over again.

So the first very simple thing that I would say to you (and it is so simple that it seems to me it ought to be said at every convention of this kind) is that this business of public relations is a very constant business, that the fact that you told your story yesterday should not lead you into the delusion of supposing that you have ever told it. There is probably no fact in the United States that is easier to impress upon people's minds than the fact that Ivory soap floats, and yet the manufacturers of Ivory soap think it not inconsistent or wasteful to spend more than a million dollars a year in repeating that fact over and over again.

It is a day-by-day and hour-by-hour business, gentlemen. Every day and every hour "the king" dies and there arises a new "king" in this country to whom you and all your works mean absolutely nothing.

Now, the second thing and very simple thing that it seems to me I might say to you is that in your dealings with the public, in what you write and say to them, you have got to be genuine; at least, you have got to appear to be genuine.

When I came to New York a great many years ago I had a lot of trouble with banks. I had great difficulty in finding any bank that would be willing to accept the very paltry weekly deposit that I wanted to make, and I finally found one which was not as closely guarded as the others, and I succeeded for over a period of three years of being insulted by the teller every Saturday. And at the end of three years when I came to draw out my money I had an audience with the vice-president who wanted personally to insult me.

I said to myself, if I live and grow old in this town, some day I think I would like to take a crack at this situation. And so as the years passed, as they have the habit of doing, and I lived and grew old, one day a bank came in to us and said they would like to have us do some advertising for them. I said to these bankers, "Now

*Address made before convention of National Electric Light Association, New York, June 5.

you go back to your office and shave off all the side-whiskers that there are in your bank and you take all the high hats and carry them out into the back-yard of the bank and you put them in a pile and light a match to the pile and burn them up, because I am going to advertise to people that you are human, and it may be a shock to have them come in and find you as you are."

And the ad said, "There is a young man in this town who is looking for a friendly bank, a bank where the officers will remember his name and where some interest will be shown when he comes in," etc.

And it was very successful. It was too successful. It was so successful that we could not control it, and all over the country there broke out a perfect epidemic, a kind of measles, of "friendly banks." Bankers who had not smiled since infancy and who never had had or needed an electric fan in their offices, suddenly sat up and said, "Why, we are friendly."

Well, our bank dropped out. The competition was too keen. But it culminated, I think, in a letter which I saw and which was mailed by the president of a really very important bank in a large city of this country. I won't attempt to quote it verbatim, but it was to this effect:

"Dear Customer: As I sit here all alone in my office on Christmas evening thinking of you and how much we love you, I really wish that you and every other customer could come in here personally so I could give you a good, sound kiss."

Well ,that is a trifle exaggerated, but the fact is this—if you don't feel these things you can't make other people feel them. Emerson said, as you will remember, "What you are thunders so loud I cannot hear what you say." Unless there is back of this desire for better public relations a real conviction, a real genuine feeling that you are in business as a matter of service, not merely as a matter of advertising service—unless there is that, then it is very dangerous, indeed, to attempt to build public relations on any other ground.

The third very simple thing, and the last thing that I suggest, is this: In dealing with the public the great thing is to deal with them simply, briefly, and in language that they can understand.

Two men delivered speeches about sixty years ago at Gettysburg. One man was the greatest orator of his day, and he spoke for two hours and a half, and nobody in this room probably can remember a single word that he said. The other man spoke for considerably less than five minutes, and every school child has at some time in his career learned Lincoln's Gettysburg Address, and remembers it more or less all his life.

Many prayers have been uttered in the Word—many long, fine-sounding prayers, but the only prayer that any large majority of people have ever learned is the Lord's Prayer, and it is less than two hundred words long. The same thing is true of the Twenty-third Psalm, and there is hardly a Latin word in it. They are short, simply, easily understood words.

Asking an advertising man to talk about advertising at a convention like this is a good deal like asking a doctor to talk about health. I have listened to many such addresses and they are all about the same. The eminent physician says, "Drink plenty of water. Stay out doors as much as you can. Eat good food. Don't worry. Get eight hours sleep. And if you have anything the matter with you, call a doctor."

So I say to you that there is a certain technique about these things, and if you have anything seriously the matter with you there probably is some doctor in your town who has made a business of that thing, and it may be worth your while to call him in.

But in the meantime, and in this very informal and necessarily general talk, I say to you, "Be genuine, be simple, be brief; talk to people in terms and in language that they understand, and finally, and most of all, be persistent."

You can't expect to advertise in flush times and live on the memory of it when you are hard up. You can't expect to advertise when you are in trouble, or about to be in trouble, and expect to get anything in that direction. It is day-by-day and hour-by-hour business.

If the amount of money that has been thrown away by people who advertise spasmodically was all gathered together it would found and endow the most wonderful home for aged advertising men and their widows in the world. Don't throw any of that money away. If it is worth doing at all, it is worth doing all the time.

For every day, gentlemen, the "king" dies, and there arises a new "king" who knows not Joseph.

Public Relations Main Topic of N. E. L. A.

Annual Meeting Held in New York with Attendance of Some 7,000—Customer Ownership and Technical Subjects Also Given Much Attention

A FIVE-DAY convention of the National Electric Light Association was held at the Commodore and Biltmore Hotels, New York, June 4 to 8. Probably the proceedings of greatest interest to electric railway men were those devoted to the building of better public relations. The principal ideas expressed along this line are treated in later paragraphs in this report.

Gen. Guy E. Tripp, chairman of the board, Westinghouse Electric & Manufacturing Company, spoke on the future of superpower systems, which he thought was bright, but the fact that they are monopolies will make them shining marks for the advocates of public ownership. However, he did not think they could well be acquired by the public, because their interstate business took them out of municipal or state scope and he saw objections from the several states to Federal control.

According to the committee on customer ownership, the sales of securities of electric light and power companies directly to customers during 1922 consisted approximately of $145,000,000 of preferred shares, $16,000,000 of common shares and $14,000,000 of bonds and debentures. This is a noteworty advance over 1921 when the aggregate total as reported reached $80,000,000. The total annual sales of securities during 1920 was estimated to be $35,000,000. Statistical information appended to the report indicates that in the past eight years no less than 425,000 customer owners have been attracted to the possibilities of investing in the securities of local electric light and power companies and the prediction is made that within three years there will be no less than one million people owning such securities. The cost of distributing these securities is becoming lower each year.

The report of the committee on insurance was presented by Ed. Wolff, chairman of last year's committee. It spoke of considerable reduction secured in premiums on both liability and fire insurance through a better knowledge of what the insurance companies require. Unfortunately, where companies are insured through local agents these agents are not always anxious to reduce the rates, because their commissions would thereby be reduced, and some companies are much indisposed to disturb their agencies. Mr. Wolff pointed out that the machinery in getting new rate schedules is extremely cumbersome, but this work would be greatly helped if companies kept carefully compiled experience records. This is becoming more common. The percentage reduction in the fire insurance rate was approximately 25 per cent, and for auto truck liability, 31 per cent. From reports received from ninety-one companies a saving in premiums of $103,769 was recorded. The lowest reported was $25 and the largest approximately $25,000, the average being $1,140.

Dwight N. Lewis, president National Association of Railway and Utilities Commissioners, in speaking of public ownership, said, in part:

"The committee of our national association on public ownership and operation reporting at our convention last year at Detroit, most emphatically repudiated government ownership, but it was just as emphatically favorable to public ownership with private operation, with protection both for the producer and the consumer through state regulation.

"The government should concern itself with the purely governmental affairs, protecting both persons and property in their constitutional rights and leave to private capital and initi-

ative the advancement of business affairs. The rights of the public may always be secured by proper oversight and regulation, and this should not go so far as to destroy incentive for investment of capital and talent. There are some who believe that for every economic ill there is a legislative remedy, a sort of quack cure-all. I think what we need most in more than one line of industry in this country today is a more carefully arranged diet with the proper nursing of an enlightened public conscience. I don't believe a weakened patient is best cured by the drastic purgatives and deadening narcotics of ill-advised statute law."

L. E. Pierson, chairman board of directors Irving Bank-Columbia Trust Company, New York, emphasized the essential character of the electric utility service by saying that should it cease functioning for a single day, modern life, as we know it, would go out. Mr. Pierson saw tendencies toward municipal ownership and said:

"If only the utilities themselves were concerned the prospect of government ownership would be serious but not alarming. The capital invested in the utilities could be withdrawn and placed in purely private industries. The plants could be sold or put to other purposes. The engineers, the executives and the technical personnel would still find their knowledge and experience in demand. The real victim of any such wholesale change would be the nation as a whole. Industry in general would suffer, politics would replace efficiency, and mounting taxes would quickly convince the public that it is infinitely easier to criticize public utilities than to operate them.

Richard T. Ely, professor of economics at the University of Wisconsin, spoke about the connection between utility operation and education. He said, in part:

"In my judgment, what is needed is a central research institute with its own board of trustees, amply and permanently supported with its own funds handed over to it without hampering conditions of any sort or description, but commissioned to organize the public utilities educationally, to search fearlessly for truth and to diffuse knowledge. The scope of the work should reach from high schools, Y.M.C.A.'s, etc., through the colleges to graduate courses and research in the universities."

Public Policy Session

A PUBLIC policy committee session was held Thursday evening at Carnegie Hall, the speakers being Julius H. Barnes, president of the Chamber of Commerce of the United States, and Martin J. Insull, who presented the report of the public policy committee. Mr. Barnes spoke of the resolution passed last month by the Chamber of Commerce of the United States, commending the state unit as the proper agency of public utility regulations and said: "This is the judgment of the business opinion of the country as to what is fair and intelligent in public relations."

The addresses and music at the meeting on Thursday night were broadcasted through special arrangements with the broadcasting stations in New York, Pittsburgh, Chicago and Schenectady, so that more than five million people were able to listen to them. This is undoubtedly the most extensive broadcasting ever attempted, and more than one hundred men and women were employed in maintaining telephone connections between the four stations.

Public Relations Discussions

IN INTRODUCING the chairmen of committees in charge of different phases of the public relations work, H. T. Sands, chairman of the public relations section, spoke about the organization of a speakers' bureau as an auxiliary to the work of state committees on public utility information, and declared the idea that an effective address must be made by a polished orator is incorrect. The public is more interested, he said, in acquiring facts in regard to an industry than in listening to flights of oratory. Two films have been distributed by the section, one entitled "Back of the Button," the other "Yours to Command," but the distribution falls short of what it should be due to the difficulty of the industry in understanding the public mind.

The committee on educational institutions recommended that the association could well undertake to endow two or three professorships which could be intended primarily to facilitate research and secondarily to provide for the teaching of a series of public utility courses. Such a department would require an endowment of $20,000 to $30,000 a year. It was the belief of the committee that when the time is ripe for such an endowment the central-station industry could well afford the expenditure.

The committee on employee relations with the public finds that fourteen member companies have issued employees' manuals and suggests that the association prepare and publish a loose-leaf manual of this kind, giving facts about the origin and growth of the industry, space for local information or instruction on the duty of the employee to help mold favorable public sentiment to the company, and how these objects can be attained.

The committee on manufacturers' advertising mentioned several companies which have conducted national advertising campaigns to build up confidence in the private ownership and operation of electric light and power companies and in the sale of electrical appliances. This assistance was commended. The report also said that a number of security houses had cooperated by running advertisements recommending public utilities' securities for investment. In connection with individual offerings of issues, much has been said in advertisements in favor of securities of this kind.

The committee on public speaking commended the work along the lines of providing public addresses conducted by the state public utility information committees and the Public Utilities Advertising Association, and spoke particularly of the effective work conducted in the Rocky Mountain district, in Boston and elsewhere. Mention was also made of a series of lectures given by Carl D. Jackson, former president of the National Association of Railway and Utilities Commissioners. At educational institutions he spoke on general economic problems and brought the utility industry into his talk in a most interesting way. He also addressed bankers, editors, state and city officials and presidents and members of faculties of several educational institutions. This was thought by the committee to be the largest thing done this year in the way of publicity through educational work.

The committee on relations of financial institutions described its efforts to draft a law which can be introduced into the legislature of New York to legalize the investment of savings banks in the securities of gas, electric power and light and telephone utilities. An effort was made to include in this list electric street railway securities, but as the representatives of the savings banks were not convinced of the advisability of including these securities, the committee did not press the point further. The law as drafted is thought to meet the views of the savings bank committee, but as the Savings Bank Association has resolved this year to support no project for the enlargement of the field of investment of its funds the bill will not be introduced this year.

The committee on women's public information spoke particularly of the need of getting the women employees of the company together for educational work along the line of better public relations between the utility company and the customers. The results so far are declared to be worth while.

The fundamental reason why it is necessary to make the effort to inform the public of the function and purposes of the public utility was discussed at length by Don Seitz, business manager of the New York *World* who said that the electric utility pioneers failed in the early days to sell the idea of electric light and power to the public, so they formed an alliance with the politician. Over-capitalization became a feature of early utility operation and the unfavorable sentiment thereby created still lingers in many minds. The facts as they are must be carried to the public consistently and continuously until the beneficent influence of the capital invested in public utilities is understood and appreciated. Nail down the facts, said Mr. Seitz, until it is universally realized that the purpose of the public utility is to provide convenience for everybody and service for every body.

A paper by Robert Lindsay, president Cleveland Electric Illuminating Company stated that the public information bureau is the only mechanism

available for representing the four elements in the public utility group—the electric light and power company, the telephone system, the gas company, and the street railway. In the final analysis, the public holds the fate of the utility industry in its hands but only through mutual co-operation is it possible to develop the highest type of service at the lowest rate. But this co-operation can only be effected when the methods and purposes of the utilities are interpreted to the public and understood. Information bureaus, however, cannot accomplish this by merely stating that the service is good and that the rates are low; it must be demonstrated also by the acts of the utility, and the bureau that gets only funds and no active support from its members will not go very far. The bureau should also be made the agency through which important news is issued to the public, for if it is allowed to become merely a clipping bureau its usefulness will be much impaired. Moreover, even though there be sincere co-operation among all the public utilities, each individual company must in addition keep up its own public relations work.

At the final meeting of the Public Relations Section, short talks were given by several members of state regulatory commissions as well as by prominent central station men. The meeting was called to order by Chairman Sands and the first speaker was M. H. Aylesworth, executive manager of the N.E.L.A. Mr. Aylesworth said that experience has shown that it is not sufficient for a utility company simply to give the best service of which it is capable. The company must also advertise the fact that it gives service. On the other hand, he said, it will not do merely to advertise without actually giving the service. Satisfactory public relations can be built only on the basis of giving the service and telling the story to the people.

The second speaker, Hon. W. D. B. Ainey, a member of the Public Service Commission of Pennsylvania, said that he visualized the function of a regulatory commission as being that of the equals sign in an equation with the duty and the privilege of the utility on one side and the privilege and the duty of the public on the other side. It is for the commission to keep the equation properly balanced. He particularly stressed the point that the public is more likely to be swayed by emotion than by logic, and he spoke of the inestimably greater value of personal contact as compared with the printed page.

The Virginia State Corporation Commission was represented by the Hon. Alexander Forward, who said that it was his experience that the utility which receives the greatest amount of consideration from the public is the one which always has time to listen to complaints. Conversely the company which pays little heed to the troubles of its customers receives but little consideration from the public. Mr. Forward mentioned also the necessity for publicity so that people shall understand what the utilities are trying to do. In this respect the street railway has the advantage over other utilities, but the latter may advertise in newspapers and send out publicity matter with their bills. By proper handling of news stories, valuable publicity can be had without buying advertising space.

The fourth speaker was the Hon. E. V. Kuykendall, commissioner of the Department of Public Works of the State of Washington. He drew attention to the fact that the decisions of regulatory commissions have more frequently been unfair to the utilities than unfair to the public. Nevertheless the public has become suspicious of the commissions. This situation he characterized as one phase of the war reaction, like the restlessness which follows a fever, and he recommended that the fundamentals of valuation, rate making, etc., should be included in school textbooks on civics.

Hon. Clyde M. Reed, member of the Kansas Public Utilities Commission, spoke, and Commissioner H. G. Wells of Massachusetts told some of the difficulties that have been experienced there. He said that three-quarters of the utility companies gave the commission no trouble, but that the service given by the remaining one-quarter was the cause of frequent and characteristic complaints from customers. The majority of the utilities in his opinion are trying to carry out the teachings of the public policy committee; and the others would do well to follow that example.

Customer Ownership Session

THE session of the customer ownership committee was held Thursday afternoon, June 7, with M. R. Bump in the chair. B. C. Forbes, editor *Forbes Magazine*, New York, said that what is needed in the utility business today is not men of light but men of leading. In a plea for wider distribution of the securities of utilities, he said that the great reason for the downfall of governments and dynasties was that the great mass of the common people were not able to get ahead of the game. By becoming investors they place themselves in an entirely different position and the country is in no danger. In the last eight years the light and power companies have attracted 425,000 customers to become stockholders, and he is of the opinion that within three years more there will be a million customer-owners.

Mr. Forbes mentioned a prize contest conducted by his magazine on the benefit of customer ownership of public utilities. Many excellent articles were received, and he recommended that the prize-winning papers be reprinted for distribution by utility companies. The arguments will then be presented by the public itself, and will carry more weight than when material in the nature of propaganda is prepared by the utilities' publicity men.

The opportunity presented the utilities by the customer-ownership plan brings with it a new responsibility to hold up the quality of the securities. He suggests that a vigilance committee be formed to attend to this vital question.

Employee ownership is believed by Mr. Forbes to be of equal importance with customer ownership. When public questions are being considered the working classes can roll up more votes on election day than any other class in the country. Whether we are to move toward state or municipal ownership will depend in no small measure on how this employee and customer-ownership movement succeeds or fails.

In conclusion, he said that if you transform America into a nation of investors you will have a happier, more contented and more cheerful people.

E. K. Hall, vice-president American Telephone & Telegraph Company, New York, emphasized the points made by Mr. Forbes and paid particular attention to the statement that the securities offered the customers must be gilt-edged, or else the public would lose confidence in the utilities as investments.

Louis H. Egan, president Union Electric Light & Power Company, St. Louis, pointed out that theoretically the customers should hold common stock so that they would feel the fluctuations of the business. Anything tending to cut down the dividends or affect the solvency of the company would then be examined with particular care by the customer-investors. As the risk of common stock may be considered too great, he makes a compromise by selling the preferred stock to his customers. In his case the stock is one-third of the capital, and this is divided equally into two classes, so that the preferred represents one-sixth of the entire investment in the property. He has been able to sell the entire issue of new preferred stock to his customers with relatively little effort, and has also considered the sale of higher-grade investments to them.

John A. Britton, vice-president Pacific Gas & Electric Company, San Francisco, told of some of the experiences of his company in the sale of securities to customers, in which he said it was a pioneer. He said that there is a pride of ownership in the average person that can be used to advantage in connection with inducing the customers to participate. It is, however, no use to try to give poor service because the customers are also owners of the property. As soon as they discover that such a policy is in force they forget their holdings and register their complaints.

Technical Section

THE prime movers committee, C. F. Hirshfeld chairman, presented a 374-page report in two sections. Emphasis was placed on recent innovations, such as higher pressures, reheating of steam, stage bleeding, useful life of turbines and internal-combustion engines. Plants

are now being considered with boiler pressures from 400 lb. up to 550 lb. and steam temperatures of 650 to 750 deg. F.

Development in the art of steam-power production has progressed far enough to make it entirely feasible to attain a goal of one kilowatt-hour per pound of coal in the near future, according to Fred N. Bushnell, Stone & Webster, who made an address on "Higher Steam Pressures and Improvement in Station Economy." One means of attaining this mark is through the use of much higher steam pressures. Already steam pressures up to 1,200 lb. have been definitely planned for commercial installation. For an experimental plant in England a critical pressure of 3,200 lb. will be adopted. Attainment of one kilowatt-hour per pound of coal cannot be reached by higher pressures alone. There must be co-ordination of this with heating of the feed water by multistage bleeding of turbines, careful selection of auxiliaries, proper design of stokers, furnaces and heating surfaces of boilers, superheaters and economizers, and burning of pulverized coal.

Prof. A. G. Christie, Johns Hopkins University, made a very frank appraisal of powdered fuel. In general, he said that while powdered fuel has many points in its favor, there is a great danger in the extensive adoption of an underdeveloped practice by enthusiasts. The decision on whether to use powdered fuel depends entirely upon each individual installation. Before there is a general adoption of powdered fuel, there is a great necessity to have power station records to analyze. Furthermore, there is an opportunity for considerable improvement in equipment. None the less, Prof. Christie commended manufacturers for the great strides they have made so far.

On account of the almost unprecedented adoption of new practices in the central-station field, some of which are almost radical in the absence of extensive experimental data, and the fact that the use factor of equipment now being adopted is indefinite, there is more necessity than ever of giving serious consideration to obsolescence in determining the economies of new innovations, asserted Peter Junkersfeld. Furthermore, the prospective capacity factor or usefulness of the unit must be carefully estimated.

In the report of the underground systems committee, G. G. Post chairman, two developments of great interest and importance to the central station industry are apparent:

First—Improvements in the quality of paper-insulated, lead-covered cables have made it possible to reduce the thickness of insulation without reducing the factor of safety of operation. Manufacturers have estimated that on this account a saving of from 10 to 15 per cent has been made in the price of cable in the last two or three years.

Second—The use of the kenotron for testing high voltage cables with direct current promises to result in the ability to detect incipient failures of cables so that weak spots may be removed and the troubles due to cable failures in service largely eliminated. During the year 1922 one company was able by means of the kenotron almost to eliminate failures in service on a number of 6,600-volt rosin oil cables.

The committee called attention to the report of the American committee on electrolysis published in 1921. Too much emphasis cannot be laid upon the desirability of organizing electrolysis committees in all cities where the rail return system of electric railways is used as it is only possible to co-ordinate the mitigative work of the various utilities owning underground structures by causing their representatives to get together and from time to time decide upon measures which will be the most economical for the utilities as a whole. In other words, the problem should be dealt with as though one company owned and operated all of the underground systems and structures.

The underground-cable structure is no less a part of a superpower scheme than the 110,000 and 220,000-volt overhead lines, declared W. S. Murray in an address before the Technical Section. To realize the future rôle the highest voltage electric cables are to play one has but to look at the rapidly forming necessity of conducting large quantities of electric power beneath the earth's surface. Our overhead day within our cities and on the approaches to them is drawing to a rapid close. Henceforth what we shall need is not only 33,000-volt but 66,000-volt cables. Too much emphasis cannot be placed on the importance of properly relaying systems to make the alternating-current network as reliable, flexible and economical as direct-current networks.

The overhead systems committee, L. M. Klauber chairman, has this year continued its work along the general lines of standardization and the investigation of new and improved practices. The report, of 176 pages, is a résumé of the information which has been gathered during the past year and covers such subjects as specifications for construction materials and methods, poles and supporting structures, insulators, insulator research, line sectionalizing and protective devices, transformer installations, construction and maintenance equipment and methods, wood pole transmission lines, joint use of poles, and transpositions.

According to information obtained by the electric apparatus committee, R. H. Tapscott, chairman, the service rendered by automatic alternating-current substations has been reliable, and keen interest in this development is being shown. Very convincing information regarding the reliability of automatic direct-current substations has been obtained during the past year in St. Louis and Cincinnati, the former being of 1,800 kw. rating and the latter of 1,875 kw.

At least two systems of complete remote supervision and control of distance switching over telephone lines have been developed and are being installed. Several companies have installed equipment to provide communication over their high-tension transmission lines. The operation of carrier-current apparatus is very satisfactory, and communication can be maintained through disturbances which would cripple the line telephone.

A definition of circuit-breaker duty cycle has been agreed upon by the A. I. E. E. protective devices committee and the electrical apparatus committee of the N. E. L. A.

Inductive Co-ordination

The report of the inductive co-ordination committee, R. N. Conwell chairman, reviews the progress made during the year. As a whole the year's work has advanced along lines of development outlined in the last report.

Co-operative procedure between the Bell telephone system and the N. E. L. A. was one of the chief activities during the year and resulted in the adoption of the joint "Principles and Practices," in the Dec. 9, 1922, report of the joint general committee. This is probably the outstanding achievement of the year. Continued organization and expansion of the activities of the geographic division and local committees on inductive co-ordination was another prominent result of the year's work.

Officers Elected

AT THE meeting on Friday the following were elected president and vice-presidents National Electric Light Association for the ensuing year:

President, Walter H. Johnson, Philadelphia Electric Company, Philadelphia, Pa.

First vice-president, John A. Britton, Pacific Gas & Electric Company, San Francisco, Calif.

Second vice-president, J. E. Davidson, Nebraska Power Company, Omaha, Neb.

Third vice-president, R. F. Pack, Northern States Power Company, Minneapolis, Minn.

Fourth vice-president, H. T. Sands, Charles H. Tenney & Company, Boston, Mass.

A.S.M.E. Nominates Officers

AT THE spring meeting of the American Society of Mechanical Engineers in Montreal, May 28-31, the nominating committee presented the following nominees for the offices of the society for next year. Election by ballot will be held in the fall.

President: Fred R. Low, Editor *Power*, New York City.

Vice-president: George I. Rockwood, Worcester, Mass.; M. L. Cooke, Philadelphia, Pa.; W. J. Sando, Milwaukee, Wis.

Managers: E. O. Eastwood, Seattle, Wash.; F. A. Scott, Cleveland, Ohio; E. R. Fish, St. Louis, Mo.

Treasurer: W. H. Wiley, New York.

American Association News

Welded Rail Joints

THE meeting of the executive committee of the welded rail joint committee was held in Cleveland, Ohio, June 1, 1923, at the offices of the Cleveland Railway, with the following committee members and guests present: E. M. T. Ryder, vice-chairman; Dr. H. L. Wittemore, representing Dr. G. K. Burgess, chairman; W. F. Graves, representing C. A. Adams; J. Wolfe, representing E. J. McIlraith; W. W. Wysor, J. H. Haylow, representing G. L. Wilson; R. C. Cram; C. F. Gailor, representing H. M. Steward; G. C. Hecker and W. Spraragen, secretary. Several members of the committee on way matters of the A.E.R.E.A. also were present as guests.

Secretary Spraragen presented a financial statement showing the amount of contributions, the amount of expenditures to date and the balance on hand.

Mr. Ryder, who presided in the absence of Dr. Burgess, stated that there had been a change in the financial arrangements between the American Welding Society and the National Research Council in regard to the services of its secretary. A resolution was passed fixing the amount to be paid to the American Welding Society by the welded rail joints committee for the services of its secretary.

Secretary Spraragen presented a statement showing the status of the shipments of rail joints for test purposes. He stated that approximately one-third of all joints had been shipped to the various laboratories and called attention to the necessity for prompt action in regard to the shipment of the remaining joints, so that it will be possible to make tensile tests before the Emery 1,150,000-lb. testing machine at the Bureau of Standards is dismantled.

Mr. Wolfe presented for Mr. McIlraith a report and drawings covering the design of a repeated impact testing machine delivering blows that represent approximately the impact delivered by an average car wheel passing over a cupped rail joint. After a discussion it was finally agreed that there were so many factors involved as to make it practically impossible to approach actual service conditions with this machine. Several modifications were suggested. Another feature discussed was the type of foundation and method of supporting the test joints. It was finally agreed to prove the design submitted by Mr. McIlraith, and the committee authorized the purchase and erection of a repeated impact testing machine at a cost not to exceed $2,000. The machine will be erected at the Bureau of Standards, Washington, D. C.

A telegram from M. B. Rosevear, chairman power distribution committee, asked that the testing machine be arranged to test trolley wire and collectors simultaneously.

Mr. Wysor then submitted a report and drawings covering the design of a rotary service testing machine. It was the sense of the committee that the design as submitted was satisfactory except for a few details. The committee voted an expenditure of a sum not to exceed $12,000 to build and erect such a rotary service testing machine at the Bureau of Standards, Washington.

Upon invitation of J. H. Alexander, president of the Rail Welding & Bonding Company, the committee visited its plant, where a very interesting description was given of the research work in the development of seam-welded rail joints. Data collected by the Rail Welding and Bonding Company were made available to the committee.

Way Committee

The committee on way matters of the American Electric Railway Engineering Association met in the offices of the Cleveland Railway on May 31. Reports of the various sub-committees were presented and action taken on each.

In connection with sub-committee No. 1, on standardization of frogs and car clearance easements, data were submitted with a view to reducing the number of standard frogs. The committee decided that formal action at this time was not justified, and recommended that a further study of the subject be made by next year's committee. In regard to car clearance easements, the sub-committee reported that it had been unable to confer with the committee on unification of car design. As this subject was considered to be distinctly a matter of car design rather than a way matter, it was decided to recommend that the subject be discontinued as an assignment to the way committee. It was further recommended, however, that a request be made that several way engineers be appointed members of the next year's committee on unification of car design.

A report of sub-committee No. 2 on substitute ties was presented. It was pointed out that several designs of substitute cars are in use on a considerable mileage of track. The committee felt that this subject was of great importance and that it should be continued. Steps were taken to secure co-operation between this committee and the tie committee of the A. E. R. A., and it will be requested that next year's tie committee have representatives of the way committee in its membership.

A report of sub-committee No. 3 was read, consisting principally of a statement of the sub-committee's activities in co-operating with the committee on buildings and structures. There was considerable discussion as to whether or not the subject of the design of small bridges, culverts and trestles should be assigned in the future to the buildings and structures committee or to the way committee. It was the sense of the meeting that this subject was primarily a way committee subject, and it was recommended that it be assigned to next year's committee.

Sub-committee No. 4 on the design of track construction for paved streets stated that the specifications had been submitted also to a committee of the American Society of Municipal Improvements, and it was the understanding that the specifications had been approved by the latter body. Formal action of the A.S.M.I. will no doubt be taken at the annual convention of this society in October. The specifications as submitted by the sub-committee were approved by the way committee with minor changes. If adopted by the A.E.R.E.A. and the A.S.M.I., these specifications should permit the establishment of more harmonious relations between city engineers and electric railway engineers as they provide for the first time a design for track construction in paved streets which appears to have the unanimous approval of all concerned.

Sub-committee No. 5 reported that the work of the welded rail joint committee had been followed and that a report of the work thus far will be summarized and included in the final report of the committee on way matters.

The sub-committee on review of existing standards reported that all of the standards on way matters in the engineering manual had been reviewed and that a number of revisions bringing the specifications into conformity with the latest and most generally accepted practices has been made. A complete report covering in detail the changes recommended will be included in the report of the way committee.

A report covering the revision of specifications for manganese steel switch pieces was presented and resulted in a great deal of discussion, the report subsequently being verified and approved.

Those present were W. F. Graves, chairman; H. H. George, vice-chairman; C. F. Gailor, secretary; E. M. T. Ryder, C. A. Alden, Victor Angerer, E. B. Entwistle, J. B. Tinnon, W. W. Wysor, J. H. Haylow, H. Fort Flowers, G. C. Estill, Charles H. Clark, Mr. Wolf, as representing A. McIlrath, and G. C. Hecker of association headquarters.

Charles A. Coffin Prize

THE committee of the American Electric Railway Association on the Charles A. Coffin Foundation prize is urging every electric railway company that contemplates participating in the award to advise the committee of its intention as promptly as possible. A representation of the railway company's activities and accomplishments covered by the field of the award should be in the hands of the committee by Aug. 15. The conditions of the award were set forth in a letter of March 19, published in ELECTRIC RAILWAY JOURNAL for March 24, page 529.

Maintenance of Equipment

Grinding Cylinders and Boring Bearings

ACCOMPANYING illustrations show equipment used in the Fairview shops of the Lehigh Valley Transit Company, Allentown, Pa., for grinding compressor cylinders and reboring the crankshaft bearings. Compressor cylinders which have become scored are babbitted and then ground by the use of this fixture. For the grinding operation the equipment is installed in the position ordinarily occupied by the compressor motor. The supporting framework has holes which fit those used for bolting the motor to the compressor frame. The mechanism is driven by a small motor with a belt and gearing attachment. When in position, the herringbone gear on the geared end meshes with that which drives the crankshaft.

A special piston is used for the grinding. This consists of a regular piston which has been cut in two and provided on the inside with means for connecting to the regular connecting rod. A spring arrangement forces the two pieces apart, so that they bear firmly against the lining of the cylinder. On the outside of the grinding piston are numerous small holes, which collect and distribute the emery grease. Additional emery grease is applied with the hand as needed. A valve grinding compound made by the Hall-Thompson Company, Hartford, Conn., is used in Allentown.

The grinding piston is turned as it is being driven, which is accomplished by means of a ring screwed into the end of the piston.

In babbitting the cylinders where there are grooves, these are scraped with a steel scraper to clean them, and these are made deep enough to hold the babbitt lining. A brass scraper is then used to coat the iron so that the babbitt will stick when applied.

Attachment Also Provided for Boring Crankshaft Bearing

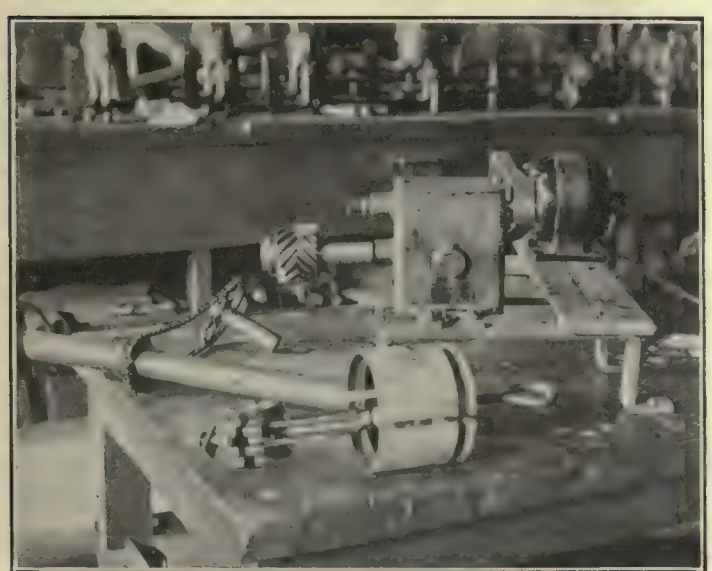
The same driving mechanism as that for grinding cylinders is used for boring out the crankshaft bearings. The herringbone pinion is removed from the geared end of the mechanism and a sprocket is substituted. The boring bar has a similar sprocket, but of smaller diameter. This is placed in position after the bearings have been babbitted, and the driving mechanism operates the boring bar through a chain, which fits around the sprocket.

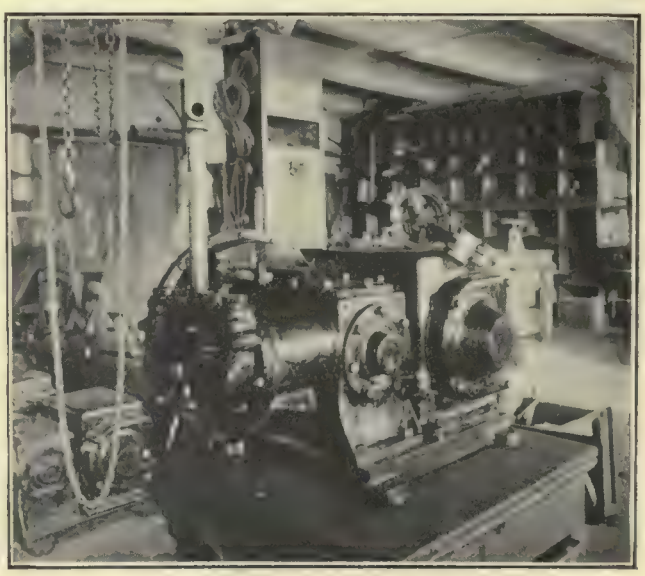
By use of this method perfect alignment is assured since the boring of all bearings is done by the same bar which is supported to insure accurate alignment.

Bending Carlines on Tire Bender

IN ITS car construction and repair work the West Penn Railways, Connellsville, Pa., has occasion to use many bent sections of steel. Where continuous curving is necessary the usual method on many properties is to bend the steel about a metal former, forcing it into position by hammers or swages. This company has obtained better results by the use of a tire bender, such as is familiar to the wheelwright. This device consists of three bending rolls, which are adjustable to produce various degrees of curvature. The standard tire bender has cylindrical rolls for flat strap tires. To accommodate angles and T sections, such, for instance, as are used in making carlines, the rolls furnished with the bender are replaced by rolls having grooves in the middle to accommodate the webs of the steel sections. This does not, incidentally, prevent the bending of flat sections on the same rolls, so that it is not necessary to change them every time such sections are bent.

Proper adjustment of the rolls for any curvature is made easily, and all carlines are thus bent to the same radius without deformation, such as is customary when they are hammered into shape in a former. The





At Left, Mechanism Used for Grinding Compressor Cylinders and Boring Crankshaft Bearings. At Right, Westinghouse D 2 EG Compressor in Place for Overhauling. Grinding Piston Shown on Top of Compressor

fitting of the carlines is easier and the assembly work that much reduced.

The facility with which the bender may be used for various operations makes it a valuable adjunct to the shop.

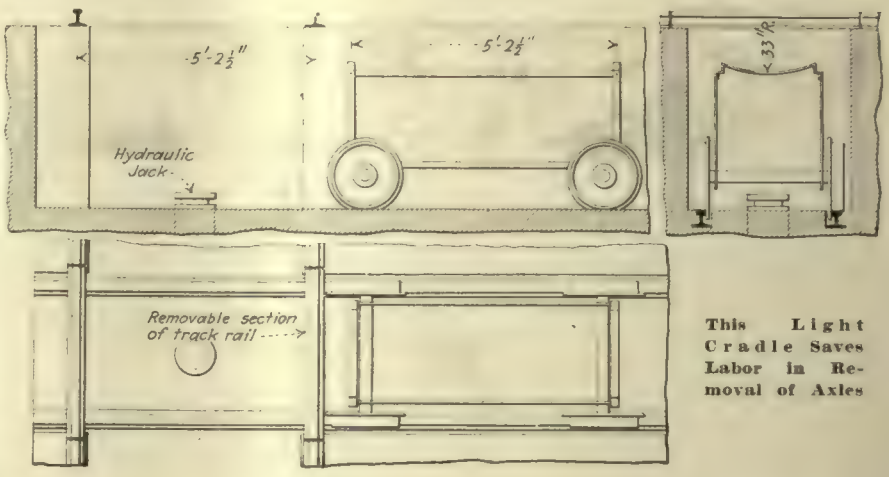
Devices for Building Up Axles and Flanges

ACCOMPANYING illustrations show attachments which have been added to an old scrap lathe for driving axles and wheels while they are being built up by arc welding. Axles are placed in the lathe centers and the lathe operating head is driven in the usual manner. As the back gearing of the lathe does not sufficiently reduce the speed a small countershaft is belted to the back shaft of the lathe, and a small pulley on this countershaft is belt-connected with a collar clamped on the axle by means of set screws. With this arrangement a very slow speed is obtained, and this can be adjusted so as to meet the desired speed of welding.

As the axle is belt-driven, it can be turned readily by slipping the driving belt. To facilitate this a clamp is fastened around the axle and the welder uses it as a handle for stopping the axle at any desired location or for bringing it back to any position should it rotate too far.

By this method all worn seats of axles are built up by applying the metal spirally around the axle and thus minimizing welding strains, producing a result similar to that secured with an automatic welding machine.

The same mechanism is used for rotating wheels, but in this case the wheel is belted to the back axle of the lathe, the belt passing around the wheel. The axle carrying the wheels is supported at the ends by two horses in a position convenient for the welder.

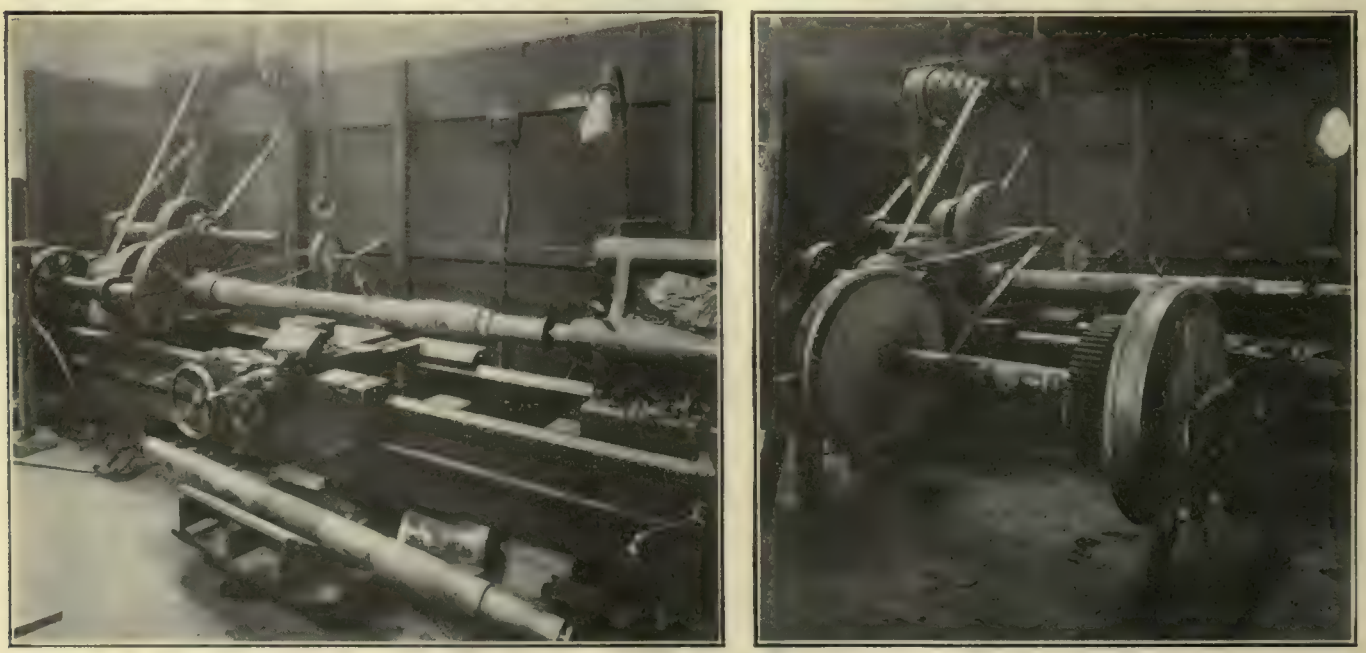


This Light Cradle Saves Labor in Removal of Axles

Convenient Method for Removing Axles

THE Beaver Valley Traction Company of New Brighton, Pa., has at its Junction Park shops a novel method for removing wheels and axles from single-truck cars. A small pit is constructed at right angles to the main track pit. A light carriage of iron strap is made with four wheels to run on a transverse track at the bottom of the side pit. This carriage has a wheelbase the same as the track gage. The top crossbars of the carriage are curved with a radius of 33 in. to take standard wheels. The short section of the track rail above this transverse pit is made removable.

In using this wheel carriage the car is run out of the pit so that one of its axles is directly above the center of the side pit. The body and truck are then jacked up, and the removable section of rail is taken out. The small carriage is then run in to line up with the wheel, after which the hydraulic jack is dropped, and the axle falls with it so that the wheels rest on the carriage. The carriage is then run out to one side, and the wheel and axle may be removed by a crane. A new axle may then be substituted for the one taken out and the car put back in service without being held up longer for the repairs to the axle.



At Left, Belting Attachment to Old Lathe for Rotating Axle During Welding. At Right, Arrangement for Rotating Wheels for Building Up Flanges by Welding



Truck Overhauling Shop Divided Into Sections by Whitewashed Lines

Eliminating Disorder in the Truck Overhauling Shop

THE accompanying illustration shows a section of the Thirty-ninth Street shop of the New York Consolidated Railroad, Brooklyn, N. Y. In order to eliminate the disordered appearance from having various truck parts scattered over the floor, the truck overhauling section is divided into squares by whitewashed lines on the floor. Each truck to be overhauled is set in the center of such a section and the various parts are not allowed to accumulate in the aisles. Sawdust is used on the floor and this is renewed at frequent intervals.

In addition to eliminating the disordered appearance by this method, the work is greatly facilitated as the men do not need to jump over various parts while working and also there is less danger of accidents happening.

Helical Gears Show Little Wear

THE West Penn Railways, Connellsville, Pa., has been using helical gears on its cars for a number of years. The original installation is still in use, and now has made approximately 500,000 car-miles. After this amount of service, the wear is very small, the gear being worn about $\frac{1}{64}$ in. and the pinion $\frac{1}{32}$ in.

This type of gearing has now been adopted as standard by the company. According to Daniel Durie, general superintendent, it has been found that much better service is obtained from the cars thus equipped. Vibration is so much less that the wear on many parts of the equipment is reduced materially. Axles and motor bearings show this especially.

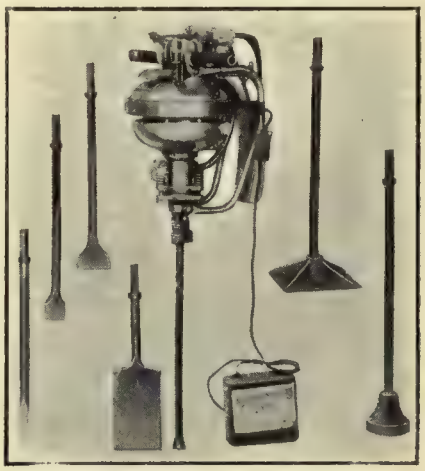
Another important feature is that commutation is much improved. Motors of the non-interpole type are in use almost exclusively on the interurban cars. With ordinary spur gearing there was considerable difficulty from flash-overs when the voltage went up above 650, but with the helical gears it has been found possible to apply 700 to 720 volts without trouble. In fact, commutation on the motors under these conditions is better than it was at considerably lower voltages with spur gears.

New Equipment Available

Gasoline Hammer Drill

A GASOLINE impact drill of the air hammer type has been placed on the market by the Pennsylvania Gasoline Drill Company, Philadelphia, Pa. This drilling unit is self-contained and portable, so that one man can operate and transport it from place to place. It combines the action of an air hammer and a gasoline engine in such a manner that the drilling unit has but two moving parts, the hammer piston and the flywheel assembly. There is no crank or connecting rod and no spring or other yielding member used in the internal construction. Exhaust valves or camshafts are not found necessary, as the air and gas passages are fixed ports, cut through the solid steel of the cylinder.

The down or power strokes of the hammer piston are made with approximately 900 lb. of gasoline explosive force thrusting it forward to hit the drill bit. The flywheel is employed only to return the hammer piston on the upward or compression stroke. Approximately 1,800 impacts are struck each minute. For carburetion, a gasoline mixing valve is used which permits the drill to be worked at any angle. While the drill continues to run at full speed, the operator shifts it from one position to another and to any desired angle without affecting its operation. To start the drill, the operator gives



Gasoline Drill and Street Opening Tools Used

the rim of the flywheel a pull by hand and it starts.

Lubrication of the various parts of the drill is provided by scoops, fixed to the hub of the flywheel, which, in turn, runs in a reservoir of oil and delivers a supply to the moving parts. A four- or six-cell dry battery is used for ignition.

Special alloy steel of 210,000-lb. tensile strength is used in the impact members of the structure. To avoid checks, flaws and other imperfections, these parts are machined from solid steel billets. When these parts are heat treated, recording instruments are employed to avoid unknown variations in the heats, thus giving uniformity in the steels. Machining dimensions with very close tolerances are fixed to assure the interchange of repair parts.

The News of the Industry

Conciliation Board Reports

Recommends the Eight-Hour Day for Ottawa Employees—Company Refuses to Accept

The board of conciliation appointed under the industrial disputes act to consider a dispute as to hours of work and wage rates between the Ottawa Electric Railway and those of its employees who are members of Amalgamated Division 279 presented its majority report on June 2. The representative of the company on the board dissented from the award.

The board recommends the establishment of the eight-hour day throughout all the departments of the business and an increase in wage rates sufficient to make the daily wage the same as was earned before in nine hours. It also recommends the abolition of the "pull in" and "pull out" carhouse time allowance so that the net result to the individual employee is a reduction in wages of about $25 per year, but the cost to the company of establishing the eight-hour day would be $115,440 per annum.

COMPANY STATES ITS CASE

A statement has been issued by the company in which it explains the reasons for its non-acceptance of the findings.

It is the company's contention to the board of conciliation that no reasonable arguments were presented on behalf of the employees proving the necessity for the eight-hour day and that it would neither increase the railway revenue nor the efficiency of the service. That if adopted the fare would inevitably be raised because the present revenue of the company could not stand the $115,440 a year which the institution of the eight-hour day would cost the company. To prove this the company presented figures showing that with a conceded value of between $4,500,000 and $5,000,000, an actual cash investment to March 31, 1923, of $4,220,762, and with net profits for 1922 of $278,914, for 1921 of $235,615 and for 1920 of $282,250, the average for the past three years was $265,593.

On the matter of wages the company claimed that it had accepted increases in wages recommended by various boards because the cost of living was abnormal. The board of conciliation last year brought out the fact that the cost of living had dropped 24 per cent. It recommended a reduction in wages of 12½ per cent, still leaving a large margin in favor of the employees. Further, that under the present wage scale a conductor or motorman can earn, without working overtime, $1,500 a year.

The company contended that the board indicated an increase in yearly wages was not considered necessary, but recommended the 6 cents an hour increase for the single purpose of establishing the eight-hour day. In fact the company argues the adoption of the majority report would mean a slight decrease in the wages to the individual trainman because it recommends the abolition of the "pull out" and "pull in" time allowance about $25 a man a year.

In conclusion the company says it cannot continue to accept recommendations from boards of conciliation which constantly add large sums to its operating expenses. Since 1918 six boards have been created by the Department of Labor to deal with the disputes between the company and Division No. 279. Feeling that the eight-hour day is not necessary or justified, the company suggests that employees who are not satisfied seek employment in some other occupation.

Plans Revived for Connection with Cincinnati Loop

Officials of the Cincinnati Rapid Transit Commission are keenly interested in reports from Indianapolis that the directors of the Indianapolis & Cincinnati Traction Company have revived plans for a connection with the Cincinnati rapid transit loop now under construction.

C. L. Henry, president of the Indianapolis & Cincinnati Traction Company, was one of the original boosters of a rapid transit loop which would afford entrance for interurbans into Cincinnati. Plans submitted by Mr. Henry several years ago, which had tentative approval of the Rapid Transit Commission, called for an extension of the line from Rushville, Ind., to Harrison, Ohio, thence through Westwood and the Mill Creek Valley to a point in Cumminsville where connection with the loop was to be effected.

At a recent meeting of directors of the Indianapolis & Cincinnati Traction Company it was stated a more convenient route had been selected by way of College Hill. The entrance to the city would be made over the track of the Cincinnati & Dayton Interurban Railway and to the loop at Spring Grove Avenue.

Frank S. Krug, chief engineer of the Cincinnati Rapid Transit Commission, said that the proposed change in the plan from Harrison by way of College Hill would eliminate the necessity of building a large viaduct over Mill Creek and represented a saving of at least $750,000.

Electrification Approved

Governors of New York and Massachusetts Sign Bills Calling for Large Capital Expenditures

Governor Smith of New York has signed the measure requiring the electrification of all railroads in the city of New York. Many representatives of the New York Central and other roads, such as the Baltimore & Ohio, operating on Staten Island, vigorously opposed the bill at the public hearing held during the week ended June 2. They declared that to comply with this order was impracticable. The law, it is estimated, if made effective will require the expenditure of between $50,000,000 and $100,000,000 before Jan. 1, 1926. The electrification measure was ostensibly directed against the New York Central's west side freight line in New York City, but as drawn is all inclusive in its provisions. Except in the case of the lines of the Baltimore & Ohio Railroad on Staten Island, nearly all the lines of the other companies entering New York are already electrified.

The electrification bill amends the public service commission law of New York as follows:

Sec. 53-a. Electrification of railroads in certain cities. No railroad corporation, operating a railroad or a part thereof within the limits of a city of the first class having a population by the last state or federal census of 1,000,000 or more, shall on or after Jan. 1, 1926, use any motive power in the operation of such railroad or part thereof within the limits of such city, except electricity to be generated, transmitted and used in said operation in a manner to be approved by the Public Service Commission. The commission shall have power to prescribe the location, elevation, size, kind and construction of poles, wires, safety devices, conduits, and all erections, buildings, fixtures, appurtenances and equipment used or found by the commission desirable, to be used in the electrification, maintenance or operation of such railroad or part thereof within the limits of such city.

Sec. 2. This act shall take effect immediately.

BOSTON ELEVATED WILL OPERATE LINE

Governor Cox of Massachusetts has signed the so-called Dorchester Rapid Transit Bill, providing for the operation of electric trains over the Shawmut Branch of the New Haven road from a point near Andrew Square, South Boston, to Fields Corner. It is intended that the Boston Elevated Railway shall operate the line.

The improvements intended to be carried out under the provisions of this measure call for the expenditure of more than $5,000,000. Of this amount it is expected that the State will be called upon to contribute about $4,000,000, while it is expected that the expenditure on the part of the Boston Elevated Railway for rolling stock and other equipment will account for the other $1,000,000 of the total expenditure.

Purchase Proposal Explained by Milwaukee Company

The Milwaukee Electric Railway & Light Company has recently explained in display space in the daily newspapers the recent reports of a proposed operating and option-to-purchase contract between the company and the city of Milwaukee.

The contract under discussion is being negotiated by committees representing the city and company, subject to ratification or rejection by the people. It will, if ratified, give the city more power than it now has to supervise the company's services. It will give the city an option to purchase the company's property at any time, on six months notice, at a price agreed on in the contract, plus cost of additions to date of purchase. It will provide a financial interest for the city in economies resulting from closer co-operation between the city and company in operating matters. The company explains that purchase by the city, at such price, would assure preferred shareholders repayment in full of every dollar they put into this business. This is the case at present, and must continue to be the case, according to the company, under state regulation of the company's financing of new growth from year to year.

In regard to bus service the company says that it aims to supply its transportation customers with whatever new forms of service they may desire. The company is operating one of the largest fleets of fast passenger and express motor buses, in city and interurban service, attached to any American street railway system. In this connection it says:

> Your company will supply increased bus service as fast as increase of public demand will warrant it. We think you need have no fear that your city government will discriminate against your company, in this field, in favor of folks from the outside. And you need have no fear of your company's ability to hold its field against all comers, in fair and open competition. We have never bragged of it, but your company for years past has been known among experts throughout the country as a leader in the invention and adoption of the best new methods and devices for improving street railway service, as well as in the other branches of its business.

The company also explained the idea behind the recently-installed city bus service, and said that "as in all large and rapidly growing cities increase in population provides plenty of work for both car and bus lines."

Wages Increased in Evansville

Frank L. Haas, vice-president and manager of the Southern Indiana Gas & Electric Company, operating the city car lines in Evansville and the Evansville & Princeton Traction Company, has announced a new wage agreement for the conductors and motormen, effective June 1. The new wage agreement calls for an increase of 4 cents an hour for employees on two-men city cars and also the same increase for interurban employees. The pact carries an increase of 5 cents an hour for employees on one-man cars.

The old wage pact, which expired at midnight, May 31, was for 36 to 41 cents an hour for two-men cars in the city, and 40 to 45 cents for one-man cars, and 38 to 43 cents for employees on the company's interurban cars.

The employees on the Evansville & Princeton Traction Company get a 4-cent increase, flat.

New men will continue to receive a 1-cent increase upon every six months of service.

Ordinance on One-Man Cars Introduced

Operation of one-man cars by the Columbia Railway, Gas & Electric Company, Columbia, S. C., will be permitted under an ordinance introduced by title into the City Council. The ordinance was introduced by the Mayor, who said he had a letter from the South Carolina Railroad Commission showing that that body had given the railway company authority to put on the one-man car in Columbia. There have been rumors for some time that the one-man cars would be used in Columbia. Charleston uses that system. The Columbia railway, which charges a fare of 7 cents with 3 cents for transfers, has, according to reports, been losing money and the adoption of the one-man car will reduce expenditures. At the present time, two-men cars are in operation. Jitneys, charging 10 cents per passenger, operate extensively in Columbia and have cut into the revenue of the car company to a considerable extent. Orders for new equipment have been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Minimum Wage Scale Increased in Birmingham

A material increase in the minimum wage scale of workers is provided under a three-year contract which has been signed by the Birmingham Railway, Light & Power Company of Birmingham, Ala., and Local No. 725 of the Amalgamated Association, according to an announcement on May 25 by R. P. Bernhart, president of the local. The new contract became effective on June 1 and succeeds a one-year contract now in effect.

No change, it is stated, is made by the new contract in the existing maximum wage scales. The new contract, it is stated, provides better working conditions. Mr. Bernhart stated that it was ratified by the union by a 9 to 1 vote.

Trainmen on the extra board are guaranteed a minimum of six hours a day under the new contract. Under the old contract they were guaranteed a minimum of 105 hours in fifteen days. Based on 125 men on the extra board, Mr. Bernhart stated that this provision of the new contract will represent an increase of about $25,000 a year. Under the new contract, it is stated that regular trainmen get better runs and that a number of split runs are eliminated and new runs created. The minimum wage for shopmen, including apprentices and helpers, is increased by the new contract from 2 to 12 cents per hour, it is stated.

Mr. Bernhart estimates that seventy men will be affected by these increases in wages.

Queensboro Subway Tunnel Open



© Wide World Photos.

The last rock of the Queensboro subway extension to Times Square was broken a short time ago. Work was started on the tunnel last August and it is hoped that it will be completed by January, 1924, which will be nine months ahead of schedule. More than six tons of dynamite was used to drill through the rock from Grand Central to Bryant Park.

California Lighting Company Wins Coffin Medal

The Southern California Edison Company, Los Angeles, of which John B. Miller is president, was presented on June 7 with the gold medal of the Charles A. Coffin Foundation, offered for the first time last year to the electric public utility company of the United States which made the most notable contribution during the year to the development of electric light and power service. This is the first award of the medal to be made by the foundation, which was created by the General Electric Company. The recipient was selected from eighteen electric light and power companies which submitted their year's records for consideration, and the decision is understood to have been extremely close. The presentation of the medal was made during the meeting of the public policy committee of the National Electric Light Association, which was holding its annual convention in New York. Frank W. Smith of New York, president of the association and chairman of the association's Charles A. Coffin prize committee, officially presented the medal.

The award of the medal was accompanied by the presentation of a check for $1,000, to be applied to the employees' benefit fund of the Southern California Edison Company, under the terms of the foundation.

The foundation comprises a fund of $400 000. the income from which is to be devoted to rewarding outstanding service in the electrical field. In addition to the gold medal to be awarded annually to an electric light and power company, provision is also made for a gold medal to be awarded to an electric railway company and for certain fellowships to graduates of American colleges and technical schools.

Commission and Mayor in Parleys on Transit for New York

A spirit of co-operation on the part of the city administration was manifested at the hearing recently before Mayor Hylan on modifications of the Transit Commission's plan for new rapid transit facilities for boroughs of Manhattan, Brooklyn and Queens. The Mayor stated emphatically that he proposed to give the public transit routes which it most desired.

Chairman McAneny of the Transit Commission told the Mayor the commission had accepted modifications of its crosstown route and the Washington Heights route which bring them into conformity with the Mayor's plans. He declared little change would be necessary in the proposed extension of rapid transit lines to Flushing and to Fort Hamilton or in the plans for completing Nassau Street line. Mr. McAneny urged approval of these routes by the Board of Estimate so that construction work could be started at once.

The Mayor expressed doubt as to the advisability of tying up new lines with existing lines operated under lease by private companies, and stated his desire to place the city in such a position financially that it could recapture any rapid transit properties deemed advantageous.

Wants Electrification of Roads Entering St. Louis

Director of Public Safety James N. McKelvey of St. Louis is sponsoring a move to compel the railroads entering St. Louis to electrify their lines within the city limits. It is part of the drive now under way for smoke elimination.

Mr. McKelvey has obtained and is studying a copy of the bill recently signed by Governor Smith of New York and referred to elsewhere in this issue providing for the electrification of steam railroads within New York City by Jan. 1, 1926.

City Counselor Haid will be requested for an opinion of the legality and advisability of a city ordinance for St. Louis to eliminate other than electric locomotives in St. Louis. Prof. E. T. Ohle, chairman of the St. Louis Smoke Advisory Committee, has stated that the McKelvey plan is worth consideration. The railroads have not been consulted.

Test Run Over Route Where Accident Occurred

Further investigation has been made by the New York Transit Commission of the accident about 5:03 p.m. on May 1, to a double-truck closed car No. 20 of the Manhattan Bridge Three-Cent Line. This car while eastbound was derailed at the Bridge Plaza, on the Brooklyn side of the Manhattan Bridge, and collided with two iron trolley poles between the tracks. The car was badly damaged and thirty-three persons were seriously injured. The preliminary investigation made by this commission indicated that either the brakes failed or the motorman failed to apply the brakes before reaching the reserve curve. As a result of further investigations made by the engineers of the commission, it developed that the equipment provided six methods of stopping the car:

1. By service application of the brakes from the motorman's valve.
2. By an emergency application of the brakes from the motorman's valve.
3. By an emergency application of the brakes from an overhead emergency valve.
4. By application of the hand brake.
5. By application of power to the motors through reversing them.
6. By the regenerative effect of the motors being short-circuited should power fail.

A car with equipment similar to the one in the accident was operated over the various grades of the line and stops made by all of the preceding methods. These tests showed that with maximum speeds of as high as 25 to 30 m.p.h., very short stops could be made upon the severe grade of the Manhattan bridge and that even had the air brake and the brake rigging of the car become entirely inoperative and the power lost for any reason the last-mentioned method of braking could still have been used in an effort to stop the car.

Maximum of Fifty-five Cents for New York State Men

The recent acceptance by employees of the New York State Railways in Rochester, Syracuse and Utica, N. Y., of the offer of the company, which embraced a wage increase of 5 cents an hour, was brought about after a series of conferences that were held in the three cities.

The men originally sought a scale up to 65 cents an hour. The wage prior to the increase was 46, 48 and 50 cents for employees of three, six and twelve months or more, respectively. Five cents an hour is added to each of these wage figures by the new contract, accepted by the men in simultaneous meetings in the three cities the morning of June 2. The chief opposition to the acceptance of the company's offer was encountered in Rochester. It is said that there was little opposition in Utica or Syracuse.

It is significant that the New York State Railways is the only large operator in the state which officially recognizes the trolleymen's union. The new contract, which expires on May 1, 1924, made no mention of a closed shop. Quite a number of employees, however, do not belong to the union at the present time.

According to officials of the New York State Railways, the wage increase involves an estimated additional expense to the company of $500,000 for the year.

Twelve per Cent Advance on Beaver Valley Lines

An agreement was recently entered into between the trainmen and management of the Beaver Valley Traction Company, New Brighton, Pa., whereby the men will receive an increase in wages approximating 12 per cent. At the same time wages of the carhouse and shopmen were voluntarily given a boost equal in percentage to the trainmen's advance. Recently employees on trackwork were given an advanced rate.

The co-operation of the employees in building up the business and in effecting economies were sufficient reasons for the increase, in the opinion of the company's representatives, although the present revenues of the company did not justify the increase. It has been many years since there was a wage dispute on the lines of the Beaver Valley Traction Company.

Journal Helps to Enforce Law

Considerable publicity has been given in the local newspapers in Buffalo to the article in the May 26 issue of the ELECTRIC RAILWAY JOURNAL entitled, "Bootlegging Jitney Rides in Buffalo." Parts of the article have been reproduced and newspapers have printed editorials calling upon the city authorities to enforce the anti-jitney law because of the unfavorable impression which is going out of Buffalo by reason of the illegal operation of buses in the city.

Strike in Albany

Service Restored Between Schenectady and Interurban Lines—Jitney Service Gains

A new trolley men's union started to function among the employees of the United Traction Company in Albany and Troy on June 2, when the company officials discharged about a score of the leading members thereof. The day following, Sunday, and the day of the opening of the Elks' state convention, the men went on strike. Three or four cars were stoned early Sunday morning in Albany, the police promptly arresting the disorderly persons. The company was able, however, to maintain a 60 per cent service in the city of Albany on Sunday, although service with Rensselaer, Troy, Watervliet and Cohoes was not had until evening. The strike lasted exactly three days, all of the men except those the company had permanently discharged returning to work. The new union admits its defeat.

Service was restored between Schenectady and the cities served by its interurban lines this week, and while no attempt was made to run the full schedule, such trains as were operated received a goodly amount of patronage.

Schenectady Lines Also Affected

In the city of Schenectady an increased number of cars are being operated, although at seven o'clock at night the cars are put in the carhouse. They are carrying many passengers.

Rioting and disorder broke out in Schenectady on June 6, when three or four cars became stalled in the heart of the city, as the result of which one of the workers is in the hospital and three arrests were made. Further rioting occurred in the middle of the night when an attempt was made to return some cars that had been left on the streets to the carhouse, during which several shots were fired.

The Mayor highly commended the police for their prompt and efficient work and called upon the citizens and strike breakers to preserve law and order in the future.

Report Expected on Findings

The state investigation being conducted by the Industrial Commission, which was to have concluded its work on June 7, with the taking of the testimony of J. F. Hamilton, again postponed its final session until June 13, at which time it is hoped to conclude its work and render a report through the public press of the result of its findings. Union officials and Harry B. Weatherwax have already been examined, the latter having been catechized quite thoroughly as to capitalization, earnings, dividends and the general condition of the company as well as his personal reasons for entering into a new working agreement with the union.

Jitney service during the hot weather has gained considerable impetus between the cities affected by the strike, and with the temporary tie-up of the Albany lines on Sunday, motor service between Albany and Troy, which has been running in the face of injunction orders ever since the big Albany strike, gained a new lease of life. A regular terminal has been established opposite the post office in Albany, with a starter in charge, and cars proceed as rapidly as loaded. The starter is paid 25 cents for each loaded car dispatched.

On June 3 jitneys were being dispatched to Schenectady, Troy and Midway Park at the rate of one every two minutes from the Albany terminal. A similar terminal arrangement is had at Schenectady for its interurban service. No attempt has been made by the jitneys to compete with the regularly established and duly licensed bus routes.

The Schenectady Railway has not yet applied for an injunction to stop jitney service in that city.

Conference Called on Chicago Situation

In an effort to avert the threatened street car and elevated railroad strike in Chicago Mayor Dever called both sides in the wage controversy into conference in his office in the city hall on June 8. Although the Mayor has met the various groups separately several times during the past week, this was the first joint meeting of the officials of both local transportation companies and the union representatives. The deadlock over the 10-cent an hour increase demanded by the men continues.

A resolution was adopted on June 4 delaying the taking of a strike vote. William Quinlan, head of the union, presented the resolution at the meeting of the street car men's union at Carmen's Hall. It set forth that Mayor Dever asked the men to refrain from doing anything to "intensify the situation" until he had further chance to work for a settlement without an actual blockade of transportation.

The resolution set forth that the men would lose nothing by granting this "fair request," but would strengthen their position. It called for a continuation of the wage negotiations, which were broken off early during the week ended June 2. If the officers, aided by the Mayor, are unable to get a settlement proposal worth while submitting to the men, they are empowered, if they deem it necessary, to take a vote of the membership on the question of a walkout.

The younger members of the union started a stampede as soon as the resolution was read. In the midst of the bedlam Mr. Quinlan pounded his gavel and declared the resolution adopted. The meeting was declared adjourned.

While the way was opened for continued negotiations between officials of the local transportation companies and the union men, a threatened walkout of the trackmen, who number 2,000, was also headed off. They also met Monday night all primed for a strike vote, but Samuel P. Luzzo, president of the union, announced that late in the afternoon he had held a conference with G. A. Richardson, vice-president in charge of operation of the Chicago Surface Lines, and that the companies had conceded that when the wage scale is fixed for the trackmen it will be made retroactive, being given the same date as that of the trainmen. A threatened "sympathetic strike" of the substation electricians, whose wage agreement does not expire until later in the year, was also forestalled by this action. Employees of the Elevated Lines are expected to take similar action at their meeting on June 9.

Wages Increased in Philadelphia

In conformity with the wage increases of the Cleveland Railway the general committee under the Co-operative Plan has agreed that the scale of wages of the trainmen of the Philadelphia Rapid Transit Company be increased 1¼ cents an hour. The new scale in cents per hour effective May 1, 1923, is as follows:

	Men New	After Three Months	After One Year
Surface motormen and conductors ..... (Operators—one-man cars, 5 cents additional.)	59	62	64
Elevated motormen ...	62	65	67
Elevated conductors ..	59	62	64
Elevated guards	59	61	62

The Co-operative Plan for Collective Bargaining provides as a basis for determining wages the average of the wage scales of the electric railway companies in Chicago, Detroit and Cleveland.

News Notes

One Dead in Accident.—One person is dead and four injured as the result of a runaway car of the Sixth and Amsterdam Avenue route speeding down the hill on Amsterdam Avenue and 118th Street, New York, jumping the track and crashing into a five-story apartment building. The accident occurred on June 7. The damage to the front wall of the building is estimated at $15,000.

Wages Advanced Five Cents.—The Pennsylvania-Ohio Electric Company and the Youngstown Municipal Railway, operating city lines in Youngstown and Warren, Ohio; New Castle and Sharon, Pa., and interurban lines connecting those cities, have entered into new wage agreements with their car service employees, granting an advance of 5 cents an hour. The new wage scale is 48 cents an hour for the first three months of service, 51 cents an hour for the next nine months and 57 cents an hour after one year, with 5 cents an hour additional on each classification for one-man operation.

Financial and Corporate

Warrant Basis in Seattle

Railway Employees Will Take Action—Five-Cent Fare Accumulates $550,000 Deficit

The Seattle Municipal Railway system is now on the warrant basis and will continue to operate on warrants for the next year as regards supplies and equipment purchased. Warrants stamped "not paid for want of funds" were issued for the April bills for supplies and equipment.

In the meantime the men's union is debating plans of procedure offered it, in case warrants issued for its members' pay and stamped not payable because of lack of funds are presented them in lieu of their checks. The head of the trainmen's union states that the union will take no action as a body until the warrants have been offered them, believing that the City Council will find some way to meet the payroll with negotiable warrants. If no such action is taken, the union members may ask for an injunction restraining the city treasurer from laying aside any money for interest on the purchase contract on the theory that labor has the first claim on the car lines' receipts.

Under the 5-cent fare, the lines will have accumulated a deficit of more than $550,000 during the months of March, April, May and June. This must be reckoned with other charges in the issuance of warrants. The fare bill raising cash fares to 10 cents, with sale of tokens at three for 25 cents, will be passed over the veto of Mayor Brown, but will not become effective before July 4.

A. W. Leonard, president of the Stone & Webster interests in Seattle, recently returned from a business trip to Boston. He has advised City Council members that the Old Colony Trust Company, trustee for the holders of the bonds issued by the city of Seattle to purchase the railway system, will be glad to discuss proposals for an extension of time in which to pay off the obligations. The first requisite for entering into negotiations would be the establishment of an "adequate fare." Mr. Leonard was not prepared to say whether the 8½-cent fare proposed would be deemed "adequate."

Files Suit to Force Payment on Chicago Railway Certificates

Holders of series 1 certificates of the Chicago Railways filed suit in the United States District Court in Chicago on May 28 in an effort to force payment of dividends at the annual rate of $8 a share with accruals on that basis from Aug. 1, 1917. The suit is directed against the company, its officials, the City of Chicago and Martin J. O'Brien, city comptroller. The municipality and the city comptroller are made parties to the suit because the latter failed to certify to bonds to which the company is entitled for extensions of its system as required by ordinances.

It is charged that under the plan for the reorganization of the Chicago Railways the series 1 certificates were to receive $8 a year cumulatively out of the net earnings before the railways should build up any surplus or make other disposition of net earnings. The payments, amounting to $240,000 a year were made up until Aug. 1, 1917. Since then the company has been used to build up a surplus, which now aggregates about $2,000,000, it is alleged in the bill. Back dividends to Aug. 1 amount to $48 a share or about $1,400,000.

The bill also asks that the company be restrained from selling, transferring or encumbering any first mortgage bonds which already have been issued to it or to which the company is entitled by means of capital expenditures.

The suit was filed in behalf of Mahlon D. Thatcher and Miss Helen P. Luce of Pueblo, Colo., and Rhode Island Hospital Trust Company of Providence, R. I.

$54,000,000 Valuation for St. Louis

Figure of Commission Contrasts with Company's Claim of $70,000,000 and City's Contention for $29,805,957 — Commission's Figure $43,347,790 Less than Par Value of Outstanding Securities

THE Missouri Public Service Commission handed down a decision on June 4 fixing the value of the property of the United Railways of St. Louis for rate-making purposes at $51,761,348, plus the Missouri Electric, a suburban subsidiary company, at $781,949, as of Jan. 1, 1919.

This means a valuation of approximately $54,000,000 because more than $2,000,000 has been added to the property since the date mentioned. The receiver of the United Railways claimed a valuation of $70,000,000, and the city's attorney contended for $29,805,957 as a rate basis value.

Will Seek Rehearing

Whether the valuation would be accepted by the receiver and the various groups of security holders had not been decided when this report was written. However, a rehearing of the case will be asked for by the railway company.

In its decision the commission stated it had taken into consideration the rule of the Supreme Court of the United States as enunciated in the Southwestern Bell Telephone case a few days ago, holding that reproduction value must be considered in evaluating public utility properties.

The commission gave the details of the valuation as follows:

Actual investment cost of physical property other than land	$35,013,419
Add 50 per cent to cover increase in prices	17,506,710
Total	$52,520,129
Deduct 30 per cent for accrued depreciation	$15,756,038
Total	$36,764,071
Add for construction overhead costs	5,252,013
Add for land at present market value	3,262,470
Add franchise (money actually expended	208,522
Add for working capital and stores and supplies	2,151,014
Add for promotion, cost of financing and consolidation	2,700,000
Add for going concern value	2,500,000
Total fair present value as of Jan. 1, 1919	$52,838,110

Of the foregoing amount $1,056,762 is not useful in transportation service. Hence the rate base as of the date aforesaid is $51,761,348, the commission comments.

It will be noted that the commission deducted $15,756,038 for accrued depreciation from the estimated reproduction cost of the property other than land.

The valuation figure is $43,347,790 less than the par value of the stocks, bonds and receiver's certificates of the company, which on Dec. 31, 1920, had a market value of $30,725,975. No prediction on the effect of the decision on the market value of stocks could be obtained from financiers in St. Louis. The normal effect would be to make the market value approach the appraised value.

The commission also announced that no increase would be made in the present 7-cent fare in St. Louis at this time. On the other hand, it declared that fares could not be reduced, as the present earnings of the railways are at the rate of 6.4 per cent on the valuation announced.

Additional Property Fixed at $1,056,762

A formal statement issued by the Missouri Public Service Commission, commenting on its decision, follows:

"The proceedings before the Public Service Commission for a valuation of the property of the United Railways, was brought to an end by the decision of the commission, as announced today, fixing the value of the property of the United Railways, of St. Louis for rate making as of the first day of January, 1919, at the sum of $51,761,348.

"The value of the company's additional property of the same date, which is not used for serving the public, was fixed at $1,056,762, making a total valuation of all the property of the United Railways, as of Jan. 1, 1919, of $52,838,110. The net additions to the property since the first day of January, 1919, to the end of the year

1922, makes the total value of all the property at the end of 1922 the sum of $53,222,012.

"The revenues for the year 1922 were $20,166,386 and the operating expenses, including $1,500,000 for depreciation, were $16,741,231. This left $3,425,155 for a return upon the total valuation of $53,222,012 at the end of 1922, which is 6.4 per cent thereon.

"Under such a showing the commission finds that the rates should not be increased; neither can they be decreased until revenues are increased or expenses reduced.

"The value of the property of the United Railways as fixed by the commission is $43,347,790 less than the par value of the stocks, bonds and receiver's certificates of the company now outstanding.

"The value as fixed included the property of its subsidiaries, the Florissant Construction, Real Estate & Investment Company, which owns 500 acres of land in St. Louis County, and the St. Louis County Railroad, which owns 2 miles of track in St. Louis County now leased to the Missouri Electric Railroad, which in turn owns and operates an electric railroad from Wellston to St. Charles.

"A separate valuation was made by the commission of the property of the Missouri Electric Railroad and the commission fixed the value of the property of that company as of Jan. 1, 1919, at $781,949. The inventories and appraisals as made by the engineers were of that date.

"The accountants of the commission made an audit of the books of the companies for the purpose of ascertaining the cost of the property now in use. Their report shows the cost of the property of the United Railways in use as of Dec. 31, 1919, to have been $47,863,728. The report of the accountants is subject to further adjustments because complete accounting records were not available.

Three Years Spent in Appraising Property

"The commission engineers under the direction of Chief Engineer J. L. Harrop spent three years in making a detailed inventory and appraisal of the property of the company. There was no dispute as to the inventory of the property.

"The case turned largely upon land values, the unit prices to be used in making the appraisal of the other physical property, the intangible values claimed by the company and deductions for accrued depreciation. The commission allowed the company for land at its present market value as estimated by its engineers and added thereto $175,000. The commission sustained the city in making large reductions for depreciation.

"The construction overhead costs as fixed by its engineers were reduced from $7,387,693 to $5,252,013, which was a victory for the city.

"In response to the ruling of the Supreme Court of the United States as announced in the recent case involving rates to be charged by the Southwestern Bell Telephone Company, the commission added 50 per cent to the appraisal by its engineers of the physical property of the company other than land, to wit: $15,506,710. That amount was added to represent increased costs which prevail now over the costs incurred by the company at the time the property was constructed. That was one of the points urged by the receiver and the company and their attorneys.

"The commission sustained the contention of the city and refused to allow any part of the $7,000,000 contended for by the company for property which had been superseded and rendered useless by changing the roads from horse and cable road to electricity. The company claimed large allowance for cost of promotion, consolidation financing and going value, which were greatly reduced by the commission.

"A final analysis of the report of the commission shows the investment cost of the property of the United Railways as estimated by its engineers, plus the present fair market value as of the date of the appraisal, to be $48,587,438.

Valuation Case Started in 1918

"The accountants' report shows the cost of the property in use at the time of the transfer of the capital stock of the constituent companies to the United Railways, was $25,001,134, and that there were issued on account thereof by the United Railways stocks and bonds to the amount of $51,654,329. The property thus acquired by the United Railways was leased for operating purposes to the St. Louis Transit Company. The Transit Company continued to operate the property until Nov. 1, 1904, at which time it became insolvent and returned the properties to the United Railways.

"The property of the United Railways as valued by the commission included all the lines in the city and in St. Louis county, excepting that of the Missouri Electric Railroad, which was separately valued.

"Counsel for the company and the receiver contended for a valuation of the properties of the United Railways of $60,000,000. C. E. Smith, engineer for the city, estimated the value of the property for rate making at $40,000,000."

The valuation case was instituted in 1918. It grew out of an application made by the United Railways to raise its rates above that fixed in its franchise from the city to meet increased wages of its employees and other increased operating costs.

The commission authorized an increase of the fares from 5 to 6 cents for adult passengers in 1918. The Supreme Court upheld the power of the commission to increase fares above the rates fixed by the franchise. The commission thereafter arbitrated and settled a controversy between Rolla Wells, receiver, and his employees as to wages. The commission subsequently increased the fares from 6 to 7 cents for adult passengers, which is the fare now being charged. The report of the commission in the case contains more than 100 typewritten pages and marks the end of a long controversy, the case having been finally submitted to the commission for decision by the filing of the company's reply brief on March 20, 1923.

Communities Must Support Utilities or Lose Service

In its decision upholding the opinion of the State Public Utilities Commission, permitting the Indiana, Columbus & Eastern Traction Company to abandon its lines between Columbus and Grove City, the Ohio State Supreme Court revealed what the attitude of a community toward its utilities should be. The issue was referred to in the ELECTRIC RAILWAY JOURNAL for May 12, 1923.

The court ruled that, after careful reading of the entire records, one is convinced that the utility could have continued to serve the community if it had had its support and co-operation. Further, it is apparent that the community cannot support truck and bus service, operate privately-owned autos and at the same time afford sufficient patronage to the rail line to justify its continued operation.

The court said, in its findings, that it was a matter of astonishment that the village, city and state executive officials, together with hundreds of people in the vicinity where the line operated, could appeal to the court to compel the continuance of a service, when the conditions which made that service unremunerative were of their own choosing.

In the opinion of the court the commission realized the economic problem, because the original order of abandonment of May 9, 1922, was suspended until Sept. 1, 1922, evidently for the purpose of probation, to determine whether the protestants were earnestly and sincerely desirous of continued railway service.

The court said that it was deplorable that the community must lose the service of the utility and that the community would indeed sustain a severe loss. It might even be that some plan of co-operation between the utility and the community could be made to save the situation, but the court ruled that the legal processes presented by this review must be resolved in favor of the commission. For that reason the utilities commission's order was affirmed by the court.

The traction line expects to abandon service about July 1 on the branch, that period of time being granted by the court to the residents along the line to offer the company some satisfactory proposition or to take over its operation, but to date, such plan has not been forthcoming, and all indications point to complete abandonment of traction service on the branch when the limit expires.

B. R. T. Reorganization Approved

Provisions of Agreement Drawn Up by Representatives of Security Holders Sanctioned by State Body

The New York Transit Commission approved on June 4 the reorganization of the Brooklyn Rapid Transit Company. This action removed the last legal obstacle to the reorganization and marks the end of the receivership, which has lasted for four and a half years. According to members of the reorganization committee, the Brooklyn Rapid Transit Company may be succeeded by the recently incorporated Brooklyn-Manhattan Transit Corporation as the holding company of the B. R. T. system early during the week commencing June 11.

The commission also approved the merger of the New York Municipal Railway Corporation into the New York Consolidated Railroad. The latter company operates the B. R. T. rapid transit lines. The New York Municipal Railway Corporation, the stock of which is owned by the New York Consolidated, was organized in 1912 to conduct contractual relations with New York City in its lease of subways. The merger of the two companies is part of the reorganization plan.

The name of the new company to be formed by the merger has not been made public. A meeting of the B. R. T. reorganization committee on June 4 authorized the purchasing committee to buy the New York Consolidated Railroad when it is offered for sale. Approval of this purchase by the United States District Court is expected at once, in which case articles of incorporation of the new company were expected to be filed in Albany on June 8.

The commission based its action in approving the reorganization plan and the merger on a thirty-page opinion by Commissioner Le Roy T. Harkness.

Mr. Harkness listed the benefits of the organization plan as follows:

1. Termination of Receiverships. Under the reorganization $5,000,000 cash and a $50,000,000 prior lien mortgage to take care of future needs are provided for rapid transit capital expenditures.

2. Long-Time Financing—The whole B. R. T. subway financing was based upon the issuance of nearly $60,000,000 six year 6 per cent notes, which during the war were replaced by three-year 7 per cent notes. This condition is remedied and the situation safeguarded by refunding these notes into long-term bonds carrying 6 per cent interest.

3. Payment of Debts.

(a) Receiver's Certificates and Accrued Interest—Receiver's certificates aggregating $12,000,000 and now carrying 8 per cent interest are paid off. Unpaid and accrued interest amounting to $27,000,000 is paid in part and the balance adjusted, thus clearing the way to paying current bond interest.

(b) Tort and Contract Creditors—Claims of tort creditors estimated at $2,200,000 are to be paid in cash in full. Claims of general contract creditors amounting to $1,600,000 are to be adjusted.

4. Provision of New Money—Stockholders are to supply $26,000,000 of new money for the purpose of the reorganization, of which $5,000,000 is to go for rapid transit needs, and the balance after paying claims and expenses, to provide additional working capital. This, with the new $50,000,000 prior lien mortgage, should put the new company in a strong financial condition, especially on the rapid transit side.

5. Public Participation—A voting trust agreement, put in evidence, provides for three representatives of the public on the board of directors.

6. Further Readjustment—This readjustment and the settlement of the legal questions that have abounded during the receivership paves the way for pressing to a conclusion the commission's plan for the readjustment of all the transit lines in the city.

7. Bettered Service and Restoration of Transfers—Over and above all, from the standpoint of the riding public, is the opportunity the reorganization gives for bettered service and the restoration of transfers as and when net earnings increase.

Mr. Harkness discussed the objections put forward by the city, which included opposition to a holding company, failure to consolidate the surface line properties, the receipts over expenditures and the valuations placed upon the company's properties by the commission. He said that the absence of the Brooklyn City Railroad, the lease of which by the B. R. T. was abrogated during the receivership, was unfortunate. He pointed out that this company might, however, come into the reorganization in the future.

Regarding the alleged overcapitalization and lack of sufficient margin of receipts over expenditures, Mr. Harkness said that a reasonable margin was indicated.

In discussing methods of valuation, Mr. Harkness held that in this case, original value less cost of putting in first-class condition was a reasonable method of calculation. On this basis the valuation of the B. R. T. properties was fixed at $164,992,589.

On June 5 the properties of the New York Consolidated and the New York Municipal Railway Corporations were sold to the representatives of the reorganization committee for $26,500,000, with the approval of Judge Mayer, on June 7.

The terms of the proposed reorganization were reviewed at length in the ELECTRIC RAILWAY JOURNAL for Feb. 17, 1923, page 304.

Sale of Waukesha Plant Being Negotiated

The Wisconsin Gas & Electric Company, Racine, a subsidiary of the Milwaukee Electric Railway & Light Company, has applied to the Wisconsin Railroad Commission for authority to issue $400,000 of serial notes for the purpose of paying in part the purchase price of the electric and gas plants of the Waukesha Gas & Electric Company, located about 25 miles from Milwaukee and 35 miles from Racine.

At present the output of the steam generating plant of the Waukesha Gas & Electric Company is supplemented by a high-tension transmission line from which the Milwaukee Electric Railway & Light Company has been supplying this company with additional energy from its Lakeside power plant.

The Waukesha Gas & Electric Company is owned by the American Gas Company, Philadelphia. The annual report of the company as rendered to the Wisconsin Railroad Commission, for the period ending Dec. 31, 1920, discloses a valuation of $983,032.

New Orleans Stock Off List

The stock of the New Orleans Public Service, Inc., both common and preferred, will be taken off the list of the New Orleans Stock Exchange. Official notification has been received by Howard W. Newman, president of the Exchange, from R. S. Hecht, chairman of the board of the Public Service, Inc., declaring that the stock is ineligible for listing under the rules of the Exchange.

Mr. Hecht stated further in his communication that the Chase National Bank, the Electric Bond & Share Company and allied interests not only control 90 per cent of the common stock as the result of the reorganization agreement, but recently became the owner of 50 per cent of the preferred stock. It was also stated by Mr. Hecht that those interested in the rehabilitation of the New Orleans system were of the opinion that it would be best to let the stock prove its value during the period of one year (the trial year) under which the public utilities are now being operated by agreement.

It was shown by Mr. Hecht that the preferred stock of the corporation advanced from 75 to 87½, under sales made in units of ten shares, between April 15 and May 15.

Jersey Central Traction Applies for Abandonment

The Jersey Central Traction Company, Keyport, N. J., has made application to the State Utilities Commission for permission to abandon its entire system of trolley lines. In its application the company gives as its reason for desiring suspension the wide use of automobiles by residents of Perth Amboy, South Amboy, Keansburg, Atlantic Highlands, Keyport and other towns. According to General Manager Hitchcock, the company has been running behind in operating expenses at the rate of $6,000 per month. The Jersey Central Traction Company employs more than 100 men and owns 40 miles of track and thirty-six cars.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons, New York, on June 6 there was sold $1,000 of the Oregon Electric Railway's first mortgage 5 per cent bonds, due 1933, interest May and November, 47 per cent.

Consolidation of Maryland Companies Proposed.—The Potomac Public Service Company and the Cumberland Edison Company will be merged into one company, known as the Maryland Public Service Company, according to present plans, which will be the subject of a hearing in Baltimore before the Maryland Public Service Commission. Both companies are controlled by the American Water Works & Electric Company.

Bids Made for Old Equipment.—The Southern Wisconsin Railway, which plans to build a railroad from Madison to the Sturgeon Bay region by way of Fond du Lac, has submitted a bid for

the ties and rail of the Wisconsin Interurban line, which formerly operated in Madison and in Portage, but which went out of business early in 1922 due to bankruptcy. The cars of the company in Portage were sold to a Portage concern. These cars were dismantled and the trucks used under converted sand cars.

Common Stock of New Jersey Corporation on 8 per Cent Basis.—The directors of the Public Service Corporation of New Jersey have declared a quarterly dividend of $1 on the new common stock, payable to stockholders of record June 15. The quarterly dividend of $1 on the new common places this issue on a $4 annual basis, equal to $8 annually on the old stock, which was exchanged on a basis of one share of old common for two of new no-par value stock.

Quebec Railway Financing Arranged.—The newly authorized issue of preferred shares of the Public Service Corporation of Quebec, subsidiary of Shawinigan Water & Power Company, will be used in part to retire the $500,000 bond issue of the company outstanding and the remaining preferred will be used as funds are required. Future financing of the Quebec Railway will be done through the medium of the Public Service Corporation, the funds to retire the impending maturity of underlying bonds having been supplied through that company.

Passes Into New Hands.—Control of the former Lima-Defiance division of the Indiana, Columbus & Eastern Traction Company, passed into the hands of the newly organized Lima & Defiance Railroad on June 1. The transfer was made in accordance with the terms of sale approved by the Federal court at Toledo. Eventually, the new company plans the use of gasoline motor cars on the line, but at present electric cars will be used with power supplied by the Northwestern Ohio Light & Power Company at Lima.

United Railways Plan Declared Operative.—The plan of the United Railways Investment Company, Jersey City, N. J., for the transfer of its Philadelphia Company holdings to a new company, known as the Pittsburgh Utilities Company, has been declared operative under the alternative proposition of the plan to transfer the stock subject to a lien of a part of the outstanding collateral trust bonds of the United Railways Investment Company. Ladenburg, Thalmann & Company, in charge of the negotiation, reported on April 26, that not enough bondholders have agreed to the conditions to make the transfer free of the lien of the entire issue.

Application Made to Sell Line.—Application has been filed with the State Utilities Commission of Ohio for authority on the part of the Pennsylvania-Ohio Electric Company to sell to the East End Traction Company, Youngstown, a line of railway in East Youngstown. The appraised value of the line is $525,994, in payment of which the East End Traction Company agrees to sell $360,000 in 7 per cent first mortgage bonds and to issue $165,994 in common stock at $100 a share, in order to raise the necessary funds. The line in question extends from Stop 10 in East Youngstown to a point on the Ohio-Pennsylvania state line where the Pennsylvania-Ohio Electric Company main line intersects the East Youngstown branch.

Offer Gold Bonds.—A syndicate including Halsey, Stuart & Company and W. A. Harriman & Company are offering $3,900,000 of the Potomac Edison Company's first mortgage gold bonds, Series "A," 6½ per cent. The price is 97 and accrued interest to yield 6¾ per cent. The bonds are dated May 1, 1923, and are due May 1, 1948. The Potomac Edison Company was incorporated Oct. 16, 1922, under the laws of Maryland, as the Williamsport Power Company, and will acquire all the properties and franchises formerly owned by the Edison Electric Illuminating Company of Cumberland, Md., and the Cumberland Electric Railway, which own and operate without competition the power and light business in Cumberland and vicinity and the street railways in Cumberland.

Preferred Issue Offered to Yield 7.53 per Cent.—An offering of 3,500 shares of the Eastern Wisconsin Electric Company's cumulative 7 per cent preferred stock is being made by Paine, Webber & Company, New York, N. Y., at 93 per share, to yield 7.53 per cent. The company was incorporated under the laws of the state of Wisconsin in 1917 for the purpose of owning and operating public utility properties, and serves directly or indirectly twenty-five communities with various classes of public utility service including electricity for light and power, gas, street and interurban railways. The district centers around the cities of Sheboygan, Fond du Lac and Oshkosh, having a total estimated population of 110,000.

Funds Deposited to Pay Interest.—It was announced in Portland, Ore., on May 25 that the Great Northern Railroad and the Northern Pacific would again advance money to pay the semi-annual interest which came due on May 1 on the $2,000,000 of outstanding first mortgage 5 per cent bonds of the Oregon Electric Railway. It had previously been learned in New York that up to May 23 the company had not deposited with the trustee for the holders of the bonds funds to pay the interest, but the opinion was expressed by the informant of the ELECTRIC RAILWAY JOURNAL that the funds undoubtedly would be deposited shortly. This matter was referred to in the issue of this paper for May 12.

Last Minute Intervention in Receivership Case.—Joseph B. Cotton, representing a group of bondholders, has filed with the court on behalf of their trustee, the Bowling Green Securities Corporation, a petition to intervene in the New York Railway receivership case. Judge Mayer, presiding in the matter, declared that he thought all parties were acting in harmony so that the receivership might be adjusted in the near future. He pointed out that if the request for delay were pressed it meant that the matter of clearing up the receivership question would have to be postponed, and declared that he thought the court had not been fairly dealt with. When Mr. Cotton filed his petition Judge Mayer was sitting in an adjourned session of the court to pass upon the form of a decree for the foreclosure of the mortgage on the Broadway & Seventh Avenue Railroad. Parties to the action were attempting to expedite an appeal from judge Mayer's ruling that mortgages secured by bonds may be foreclosed in receiverships.

$1,225,000 Value of Superior Lines.—The Wisconsin railroad commission has fixed the value of the operating property of the Duluth Street Railway in Superior at $1,225,000. This is an increase of $268,000 since the last valuation in August, 1921, following the appeal of the company for a new valuation upon which a new rate could be determined. In all probability the company will ask for an increase in fares from 6 cents to 8 cents. The valuation which has been announced by the commission shows an increase of $508,313 over that of June 30, 1911, over which the controversy raged during the last fight for an increase in rates. That proceeding resulted in the increasing of rates from the sum of 5 cents to 6 cents. The Duluth Street Railway, in its appeal for a new valuation, stated that $1,750,000 was considered a "fair and reasonable" figure. The total income of the Superior lines during the first eleven months of 1922 was $351,863. Operating expenses and taxes amounted to $331,026. A loss of $7,537 was shown for the first eleven months of 1921.

Merger of Subsidiaries Planned.—The United Railways & Electric Company, Baltimore, Md., has perfected a plan for the merger of its divisional companies into a single corporation, the purpose being to simplify its corporate structure and to make favorable provision for the parent company and its subsidiaries. The system of the United Railways & Electric Company, it is explained, divides itself naturally into two parts. On one hand the old city lines and old suburban lines, and on the other the new suburban lines. Practically all of the old lines became one in the consolidation of 1899. The new suburban lines have been built by separate companies in order to obtain the best price for securities by giving the investor a first lien upon the new properties. It is proposed to consolidate and unite the Sparrows Point line and the Halethorpe line with the Maryland Electric Railways, which also owns certain trackage, into one company under the broad charter powers of the Maryland Electric Railways. All of the stock of the consolidated company will be owned by the United Railways & Electric Company.

Traffic and Transportation

United States Supreme Court Passes Ruling on Municipality Jurisdiction

In two practically parallel cases decided on June 4, with Associate Justice Sutherland reading the opinions, the United States Supreme Court declared that a municipality cannot regulate electric railway fares outside the corporate limits.

In the case of the Georgia Railway & Power Company, the Georgia Railway & Electric Company, R. C. Hickman and others against the town of Decatur, Ga., the companies, one the owner and the other the lessee of a railway line, operated in Decatur under an ordinance fixing the fare between Decatur and Atlanta at 5 cents. In 1920 the fare was increased to 7 cents, and litigation arose. Hickman and other citizens living on another car line which had a 7-cent fare into Atlanta intervened, alleging that a 5-cent fare was discriminatory, inasmuch as the state commission agreed to the increase by the line in litigation. A preliminary injunction was affirmed by the State Supreme Court, but reversed by the United States Supreme Court, which held that the ordinance was not binding outside the corporate limits of Decatur.

The same corporations and J. D. Malsby and other citizens appealed a similar injunction which had been granted the city of College Park, Ga., having a 5-cent fare ordinance to Atlanta, which the companies attempted to increase to 7 cents. After the ordinance was accepted as a franchise, the corporate limits of College Park were extended. The Supreme Court held that the ordinance was effective only as to the old corporate limits.

Interurban Parlor Car Service Started in Wisconsin

Parlor car service between Milwaukee and Sheboygan, Wis., was started on April 30 by the Milwaukee Northern Railway, which was recently acquired by the North American Company. The parlor car, known as the Lake Shore Limited, gives daily service, leaving Sheboygan at 8 a.m. and connecting on its arrival in Milwaukee with the Eastern Limited of the Chicago, North Shore & Milwaukee (electric) Railroad for Chicago. Only one stop is made en route. The reduction in running time over regular trains is 29 minutes. The car leaves Milwaukee at 5:15 p.m. There is thus created direct electric interurban connections between Sheboygan and Chicago. A charge of 25 cents over and above the regular fare is made for parlor car seats. The car used in the new service was built in the Cold Spring shops of the Milwaukee Electric Railway & Light Company, another subsidiary of the North American Company. It is luxuriously appointed and compares favorably in its appointments with steam road parlor chair cars.

No Temporary Eight-Cent Fare in Buffalo

The International Railway, Buffalo, will be unable to put into effect a temporary 8-cent fare on the local lines in Buffalo as a result of the Ryan bill signed by Governor Smith. The new law was sponsored by Senator Ryan of Troy and deprives the Public Service Commission and public utilities companies from putting into effect temporary schedules of rate increases. Under the old law any public utility could file a schedule increasing its rate with the Public Service Commission, and, after the expiration of thirty days, put it into operation temporarily upon one day's notice, providing no adverse ruling on the application had been made by the commission.

The Ryan law now prevents the International Railway from putting the proposed 8-cent fare into effect in Buffalo until after hearings are held by the commission and a final order is made by the commission. The commission's order in such event would be permanent, not temporary, as had been proposed.

Auxiliary Bus Service Extended

The Connecticut Company started a through bus service between Mill Plain, Branford, and State and Chapel Streets, New Haven, on June 10. It is intended to serve through riders and those residents of the section between East Haven Green and Branford not served by the trolley. Forty-five-minute service is operated during the day and one and one-half-hour service during the evening. Two twenty-five-passenger vehicles are used.

The running time from Branford Green to State and Chapel Streets is thirty-five minutes. The fare is 10 cents for each fare limit, or 30 cents for the entire trip. Transfers are issued from the bus and accepted on the trolley to the first fare limit in Branford and New Haven. Transfers are also to be issued from the trolley to the bus in both cases and accepted on the bus as 7 cents toward payment of the first fare; that is, a transfer received on a trolley car with the payment of 3 cents entitles the passenger to ride to the first fare limit on the bus.

The bus is operated express between the easterly side of East Haven Green and State and Chapel Streets, stopping on inbound trips only to discharge passengers and on outbound trips only to take on passengers destined to points beyond East Haven Green.

Movement Against Jitneys Planned in Detroit

In connection with the move to bar jitneys from the streets of Detroit, Ross Schram, assistant general manager of the Department of Street Railways, contends that the jitneys are clogging traffic and that their drivers are taking $1,000 a day from the municipal railway. The drivers are using their 1922 licenses as the police refuse to issue new permits on account of the pending litigation as to the legality of their using the streets, from which the Council thought it had legislated them.

In a letter to Mayor Doremus, Mr. Schram states that the injunction case has never come to trial, mainly through reluctance on the part of the department to force the issue until such time as the department felt it had improved service on its own lines. He thinks the time has now arrived to attempt regulation of jitney operations, in justice to the department of street railways.

The carrying of 20,000 passengers daily by the jitneys means that Detroit is probably losing $350,000 a year, which would otherwise be available to help the citizens purchase their own railway lines.

Mr. Schram says that the department of street railways now has the equipment necessary to handle the 20,000 people who patronize the jitneys. Since the first of the year, 180 new cars have arrived in the city and twenty more are on the way. This will give 200 cars to use in place of the jitneys, and a study is now being made to determine on what lines the cars are most needed.

According to Mr. Schram most of the jitneys are privately owned and when an owner desires to use his car he withdraws it from the jitney service. No complaint is made by officials of the city against competition by the Detroit Motorbus Company as that company furnishes a reliable transportation service.

The corporation counsel is ready to proceed immediately in court to have the injunction dissolved which has prevented the jitneys from being ruled off the streets.

On the other hand an ordinance has been prepared by the attorney for the jitney operators designed to license and regulate the operation of jitneys.

$750,000 of Buses Ordered for Los Angeles

The Los Angeles Motor Bus Company, organized by the Pacific Electric Railway and the Los Angeles Railway to operate motor-bus feeder lines in the city of Los Angeles, has ordered $750,000 of the most improved type of motor buses. This action is in line with the promises of the two railways to the city of Los Angeles after the defeat of the McAdoo bus scheme at the May 1 election. The order for the new buses was placed on May 26 with the Moreland Motor Truck Company, Los Angeles. The buses will cover routes totaling approximately 70 miles.

The $750,000 order calls for two styles of the latest type of motor buses manufactured by the Moreland concern, both single and double decks. The single-deck buses will seat twenty-six and the double-deck ones fifty-six passengers.

Hearing on One-Man Car Operation by Cincinnati Interurban

A hearing on the operation of one-man cars by the Cincinnati, Georgetown & Portsmouth Interurban Railway was held before the Public Utilities Commission at Columbus on June 4.

The street railway employees' union of Cincinnati contends that the one-man operation of the interurbans is dangerous and wants the commission to stop it.

The hearing brought out the fact that employees of the interurban road have asked for a considerable increase in wages and that the company has served notice on them that it desires to terminate its contract with the employees.

A number of witnesses testifying for the company, residents of points served by the road, said the service was satisfactory and that they did not consider it dangerous.

At the beginning of this year the Cincinnati, Georgetown & Portsmouth Interurban Railway began the operation of one-man cars on its line. The new type cars, however, were operated by two men until April 29, when the one-man system was formally put into operation. A decision will be given later.

Rerouting of San Diego Lines Improves Service

The so-called Sixteenth Street cut-off of the San Diego Electric Railway, San Diego, Calif., has been completed and on May 1 the Logan Avenue line and the National City and Chula Vista interurban line were routed via Broadway and the new track on Sixteenth Street, instead of the former route via Fifth and Market Streets. The new arrangement furnishes improved and increased service to the suburban cities of National City and Chula Vista. Electric cars will operate every twenty minutes to Eighth and National Avenue, National City, and alternate cars will continue to Third Street, Chula Vista, but motor coach service connects every forty minutes with the cars that stop at Eighth and National, thus giving Chula Vista twenty-minute service also. The motor coaches operate by way of Highland Avenue, to Third Street, Chula Vista, thus serving different territory from the electric cars, but with the same terminals. The interurban cars will operate on express schedule between Thirty-first Street and National Avenue and Twelfth Street and Broadway, making only compulsory stops.

Passengers from the northeast part of the city, under the new arrangement, can transfer to the Logan Avenue and interurban lines at Twelfth and Broadway and at Sixteenth and Broadway, thus saving the ride to the downtown district and consequent loss of time in reaching the industrial section.

New Ordinance Proposed by Jitney Men in Birmingham

Jitney men are circulating petitions for an election on a jitney regulation ordinance drawn by the Jitney Owners' and Operators' Association of Birmingham, Ala. They will seek to have this ordinance adopted at the polls as a substitute for the jitney regulation features of the ordinance recently adopted by the City Commission, when a settlement of issues with the Birmingham Railway, Light & Power Company was effected. One mass meeting has already been held by the jitney men and others are to be arranged.

The proposed ordinance is to be presented to the commission under the initiative feature of the Birmingham charter. This provides that on a petition of 1,500 citizens legislation can be initiated. The law requires that the proposed ordinance be set out in full on the petition. When the names have been checked and found sufficient the commission must either adopt the ordinance presented without amendment or alteration or must submit the ordinance to the people at an election.

Thirty-eight of the petitions are in circulation. The ordinance carries about the same regulations now in force —not those provided in the ordinance to go into effect July 1. It provides for an association of jitney men which shall maintain a revolving indemnity fund of $2,500 in lieu of the $10,000 indemnity bonds provided by the city in its new ordinance. It removes all of the other restrictions included in the new city ordinance which would tend to eliminate the jitneys. Membership in the association maintaining the indemnity fund is made voluntary in the proposed ordinance.

Program of Improvements Offered for Exclusive Rights

The Berkshire Street Railway, in a letter from General Manager C. Q. Richmond to the Mayor and the aldermanic committee on street railways, has proposed that the company be granted a monopoly of transportation by barring all jitney traffic. This is made a condition to the adoption by the company of extensive changes for the improvement of railway service, including partial conformance to the aldermanic committee's plan for "lap-overs" of zones during factory rush hours. This would reduce the cost of rides in many instances in the morning and late afternoon hours, but the rate for noon-hour rides would remain as at present.

The most important of these competing lines is the bus line from Pittsfield to Dalton and a proposed bus line from Pittsfield to Great Barrington, for which a petition has been filed by Frank J. Hazard. Pittsfield, and Burton L. Millard, Winsted, Conn.

Four Tokens for Twenty-five Cents.—The International Railway, Buffalo, has been directed by the Public Service Commission to issue four tokens for 25 cents between Hoffman station and Martinsville on the Buffalo-Lockport interurban division under the same rules as those governing a 10-cent cash fare.

Trackless Trolley Bill Signed.—The Governor of Wisconsin has signed the bill which gives permission to City Councils to grant franchises for the use of trackless trolleys. The measure is understood to have been introduced primarily in the interest of the Milwaukee Electric Railway & Light Company.

Allows One-Man Cars to Operate.—The Lykens Valley Railway, Williamstown, Pa., has been authorized by the Public Service Commission to operate one-man cars in the upper end of Dauphin County. The permission is granted on the condition that all cars are stopped on the near sides of grade crossings.

Bus Operation to Start on July 1.—The Des Moines City Railway will put buses into service on several lines during the present year and at least two lines will be in operation by July 1. The buses will be used as supplemental service and will be extensions of present lines. The first service to be started will be on the University and Walker Streets lines. The City Council has given its approval to the use of buses.

Urges Restoration of Skip Stop.—The return of the skip-stop system on the lines of the Cincinnati Traction Company as a contribution to the improvement of traffic conditions in Cincinnati has been recommended by attorney Michael G. Heintz in an article in the *Evanstonian*, the official organ of the Evanston Welfare Association. The Cincinnati *Times Star* of recent date refers to Mr. Heintz's views and quotes what he has to say about the frequency of car stops as it affects Evanston. The skip-stop plan, he believes, would bring about a shortening of running time and be a preventive for traffic congestion. Further, that it would prove a benefit not only to the car rider but also to the automobile rider.

Mail Men Must Pay.—The Morris County Traction Company, Morristown, N. J., has issued orders to its conductors to collect fares from letter carriers, who hitherto have ridden without charge. The order applies to all points along its lines from Lake Hopatcong to Maplewood, with some question still existing as to its enforcement in Summit, where a clause in the franchise stipulates that mail men shall ride free. Charles Fields, manager of the traction company, says that the change was made with the approval of Postal Inspector Campbell of that district. Mr. Fields said it was intended to sell postmasters books of 7-cent tickets, which will be given to carriers for use in deliveries, but that some of the carriers had abused the privilege and had ridden free outside the limits of municipalities where they worked.

Book Reviews

E.M.F. Electrical Year Book

Electrical Trade Publishing Company, Chicago. 1,030 pages.

The second edition of the "EMF Electrical Year Book" is a combined dictionary, encyclopedia and trade directory of the electrical industry. Of its original 14,000 or so topics, nearly half have been rewritten or thoroughly revised and several thousand new topics added. Definitions cover the entire range of electrical terms. The encyclopedia topics include facts and figures on each branch of the industry, complete lists and data of electrical associations, periodicals, libraries, colleges, etc. About 3,150 classifications of electrical and related products are included, with listings of manufacturers. The topics dealing with electric railways and their equipment were prepared by C. C. Beck, W. T. Thorn, C. S. Holcomb and August J. Fry.

Essentials of Transformer Practice

By Emerson G. Reed. 265 pages. The D. Van Nostrand Company, New York.

The sub-title of this book states that it is a treatment of the theory, design and operation of the transformer, from a practical engineering viewpoint, prepared primarily for the engineering student and the designing and operating engineer.

Only those theories, however, are developed which have a direct bearing on design and operation. The author states that the series of lectures given by him before the Electric Club of the Westinghouse Electric & Manufacturing Company was the nucleus of the work, which was supplemented by matter in several papers presented before the National Electric Light Association. This material has been revised and rearranged and new matter added to form the present book. The entire work is written from the viewpoint of the commercial designing engineer and appears to be thoroughly practical and to the point.

Highways and Highway Transportation

By George R. Chatburn, professor of applied mechanics and machine design and lecturer on highway engineering at the University of Nebraska. 472 pages. Thomas Y. Crowell Company, New York, N. Y.

The primary object of this book, as stated by the author, has been to sketch briefly and simply the development of the transportation systems of the United States, to indicate their importance and mutual relations, to present some practical methods used in the operation of highway transports and to make seasonable suggestions for the betterment of the roads and of the usable machines for the benefit and pleasure of mankind.

The principal part of the text is divided into two parts—the development of highways and their uses. The first part treats of the relation of transportation to civilization generally, explaining briefly how the two have grown together like children at school, how each helps the other and how the development of one is the measure of the other. Automotive transportation for business and pleasure, including rural motor express and bus lines and their effect on production and marketing, is described and discussed.

Of particular interest to the electric railway man is a chapter on railroads, giving the development of the railroad with a brief description of the electric railway. The chapter on highway accidents and highway aids to traffic calls attention to many types of accidents, including railway crossing accidents, with suggestions for their mitigation.

The book appears to be sensibly written and is well illustrated. As a general treatise on the subject, it is worthy of the reader's attention.

New Edition of Cook's Wiring

Interior Wiring and Systems for Electric Light and Power Service. By Arthur L. Cook, professor in Pratt Institute, Brooklyn, formerly electric power engineer Westinghouse, Church, Kerr & Company. Second edition. John Wiley & Sons, Inc., New York, N. Y.

Wiring is a subject which concerns the electric railway engineer who has in hand the lighting and power supply for shops, stations, carhouses, etc. To all such a manual of this sort will prove useful. It goes somewhat beyond the field specified in the title in the selection of motors, some elementary illuminating engineering and choice of systems. It contains many reference tables, conveniently arranged.

The Engineering Index for 1922

Published by the American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York, N. Y.

This is the twenty-first volume of the Engineering Index and the fourth to be issued by the A.S.M.E. It is based on some 1,300 periodicals, reports and other publications regularly received during the year by the Engineering Societies' library. This is the largest volume issued in the series, exceeding that for 1921 by approximately 15 per cent, and has a total of 675 pages. The references have also been made exceedingly concise, so that the total number of articles listed is far greater than ever before. Approximately half of the references are from foreign periodicals, some 20 per cent being from periodicals printed in Great Britain or its possessions, and approximately 30 per cent from representative publications of Belgium, France, Germany, Italy, Spain, South America and other foreign countries.

The Young Man and Civil Engineering

By George F. Swain, consulting engineer, professor of civil engineering in Harvard University. The Macmillan Company, New York, N. Y.

Under the editorial direction of Prof. E. Hershey Sneath of Yale University, the Macmillan Company is issuing a vocational series consisting of a dozen books written by leading men in as many different vocations. Several of these will deal with engineering, the first to be issued being that by Prof. Swain. The books will be useful to young men who are selecting a vocation or who, having selected one, wish to gain a broad view of its history and possibilities.

In his book Prof. Swain gives an inspiring picture of engineering in general and civil engineering in particular, showing how all engineering is related and at the same time how it is subdivided. Taking up each branch of civil engineering in turn he tells of what it consists and points out its relation to the others. He then takes up the qualifications necessary or desirable in the civil engineer, stating among other things that he should "have a perception of the true relations of things or a sense of proportion which will indicate what measures or projects that are physically possible will really conduce to the use and convenience of man."

The book as a whole makes stimulating reading. It will be helpful to any one who may be called upon to advise an aspirant for the career of a civil engineer, giving as it does suggestions regarding education, professional posregarding education, professional possibilities in this field, and the general told in a delightful and helpful way.

Year Books

Spring is the season for the appearance of the year books of national and local societies. Among those which have recently appeared and which may be useful to electric railway men are the following:

American Engineering Standards Committee, 29 West Thirty-ninth Street, New York City. This contains practically everything that one would need to know about the committee. The electric railways figure largely.

American Institute of Electrical Engineers, same address as above. A 500-page volume containing alphabetical and geographical distribution lists of the 14,401 total membership, consisting of fellows (574), members (6 honorary, 2,212 regular) and associates (11,609). Students to the number of 2,673 are stated to be enrolled representing nearly 100 educational institutions.

Society for the Promotion of Engineering Education. F. L. Bishop, secretary, University of Pittsburgh.

This list of names of 1,608 engineering educators and others and eighty-seven educational institutions will be useful to electric railways desiring to co-operate with the teaching fraternity in promoting employee training.

Personal Items

New President in Toledo

B. C. Adams Has Succeeded Frank R. Coates, Who Has Assumed Larger Duties in New York

Benjamin C. Adams, vice-president and general manager of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., operated by Henry L. Doherty & Company, will succeed Frank R. Coates as president and general manager of the Community Traction Company and in addition has been made vice-president and general manager of the Toledo Edison Company at Toledo, Ohio. Mr. Coates, who was president and general manager of the Edison Company, retains the presidency of that company and will continue on the directorate of the Community Traction Company.

Details of the change will probably be announced later. It does, however, mark the withdrawal of Mr. Coates from most of his active duties with the Toledo properties and the asumption of larger duties with Doherty and the Cities Service Company in New York.

J. Frank Johnson was recently made vice-president and general superintendent of the Community Traction Company. Ferd Derge will remain as vice-president and assistant general manager of the Toledo Edison Company, according to present plans.

Mr. Coates came to Toledo on Dec. 5, 1911. He has been instrumental in putting the Toledo system in such relations with the public that the service-at-cost ordinance was ratified by a large majority more than two years ago. He was head of the company during the fight against 3-cent fares, when the ouster ordinance was adopted, and has a particularly notable record in the handling of labor difficulties.

Mr. Adams is a comparatively young executive and has come up through the Doherty organization, having been in St. Joseph about five years. He has worked on a number of other properties.

More Changes in International Personnel

William J. Whiteside has resigned as traffic agent of the International Railway, Buffalo. Mr. Whiteside had been associated with the International as traffic agent for more than ten years. He has had supervision over ticket sales on all interurban lines.

R. F. Kelsey has been appointed traffic agent to succeed Mr. Whiteside. For several years Mr. Kelsey has been joint agent of the Erie Railroad and the International at the Lockport, N. Y., interurban station.

T. T. Nelson has resigned as comptroller of the International Railway. Mr. Nelson joined the staff of the International about two and a half years ago as comptroller.

R. R. Ray has resigned as employment agent of the International Railway. He joined the staff of the company in the summer of 1920.

George W. Fugitt, who for many years has been associated with the Philadelphia Rapid Transit Company, has been appointed secretary of the International Railway Co-Operative Association and will have supervision over employment, according to an announcement made by President Herbert G. Tulley. Mr. Fugitt will assume some of the duties of R. R. Ray, resigned.

Union Traction Company of Indiana Makes Changes in Division Heads

J. E. Hester, formerly master mechanic of the Union Traction Company of Indiana, recently resigned his position to become associated with the Interstate Public Service Company, Scottsburg, Ind. Mr. Hester will have charge of the motive power maintenance for that company. Mr. Hester became connected with the Union Traction Company twenty-three years ago when he was employed as bridge carpenter. He later became general foreman of the woodworking and carpenter departments at the North Anderson shops. Mr. Hester, however, wanted a bigger promotion and he later won for himself the position of master mechanic, which he held for several years prior to his resignation.

W. O. Smith has been made division engineer of the Anderson division of the Union Traction Company. Prior to his joining the Union Traction forces, which was on Jan. 1, 1917, he was employed by the New York Central lines at Elkhart. On April 15 of this year he was made engineer of the Tipton division, taking the place of A. R. Manifold, who was transferred to the Muncie division.

A. R. Manifold, on May 1, was made division superintendent at Muncie, filling the position made vacant by the resignation of G. M. Rozelle, and George Powell, formerly division engineer for the Anderson division, took the Muncie division as engineer. Mr. Powell became associated with the company in 1917, when he entered the employ as a draftsman. Less than a year later he was made office engineer and on Aug. 7, 1919, was made engineer of the Anderson division.

C. H. Evenson has been appointed superintendent of transportation of the Chicago Surface Lines.

A. S. May has been made treasurer of the Berkshire Street Railway, Pittsfield, Mass., with office in New Haven, Conn.

S. N. Irelan Succeeds Mr. Adams at St. Joseph

S. N. Irelan, Montgomery, Ala., has been appointed manager of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., succeeding B. C. Adams. He will also be vice-president of the company. Mr. Adams, as noted elsewhere in this department, goes to Toledo, Ohio.

Mr. Irelan was graduated from Purdue University at Lafayette, Ind. Following his graduation in 1899 he enrolled in the engineering school of Mr. Doherty at Denver and remained there a year. He then took a position as secretary and treasurer of the Fremont Gas & Electric Company at Fremont, Neb. He remained there two years and then took a position in the engineering and statistical department of the Henry L. Doherty Company in New York City.

From February, 1914, to September, 1915, Mr. Irelan was general manager of the Bartlesville, Okla., plant, going from there to Sedalia, Mo., to become vice-president and general manager of the City Light & Traction Company. He was promoted to the office of vice-president and general manager of the street railway, electric and gas company at Montgomery, Ala., in 1916 and remained there until accepting the St. Joseph position.

W. H. Damon Appointed Engineer in Milwaukee

W. H. Damon of Madison has been appointed resident engineer in Milwaukee for the Wisconsin Railroad Commission. In this capacity he succeeds E. J. Steinberg, who resigned on June 1 to become connected with the Milwaukee Electric Railway & Light Company. Reference to his resignation was made in the ELECTRIC RAILWAY JOURNAL, issue of May 5, 1922.

Mr. Damon, his successor, has been with the Railroad Commission for approximately ten years and has served as resident inspector in both the Eau Claire and Appleton districts prior to his promotion to his present position at Madison.

He is well informed on the commission's methods and policies in the regulation of the service of public utilities. His work in Milwaukee will consist largely of investigations of the service of the street railway, electric, gas and telephone utilities. In addition to this, he will be required to furnish service specifications as a basis for street railway schedules in the city of Milwaukee. Mr. Damon is a graduate of the University of Wisconsin.

L. F. Wiegand, formerly executive in charge of the investment department of the Iowa Railway & Light Company, Cedar Rapids, has been appointed assistant vice-president in charge of investments of the Central Indiana Power Company, Indianapolis, and the Indiana Electric Corporation, which is controlled by the Central Indiana Power Company.

Leroy J. Clark has succeeded Harry S. Adams as secretary of the Seattle & Rainier Valley Railway, Seattle, Wash.

Walter N. Munroe, formerly manager of the Paris (Tex.) Transit Company, is now vice-president as well as manager.

G. J. Hickman has been made assistant treasurer of the Utah Light & Traction Company. He is located in New York.

George Little has succeeded I. E. Maxwell as master mechanic of the Salt Lake, Garfield & Western Railway, Salt Lake City, Utah.

T. W. Favelie has succeeded T. N. Favelie as engineer of maintenance of way of the Hydro-Electric Railways, Windsor, Canada.

Ralph H. Jewell has been appointed general counsel and assistant to the president of the Salt Lake & Utah Railroad, Salt Lake City, Utah.

W. S. Hill has replaced C. H. Nelson as superintendent, purchasing agent and claim agent of the Grays Harbor Railway & Light Company, Aberdeen, Wash.

H. E. Bailey is acting superintendent of the New York, New Haven & Hartford Railroad, New York, N. Y., at Harlem River in place of F. M. Clark.

R. C. Lightcap has been added as an assistant treasurer of the West Penn Railways and of the controlling company, the West Penn Company, at Pittsburgh, Pa.

F. T. McCann, formerly master mechanic of the New York State Railways at Utica, has been transferred to Syracuse and there succeeds J. F. McInerney. His place at Utica is being filled by F. J. Doyle.

G. R. Loyall has replaced J. H. Young as president of the Norfolk (Va.) Southern Railroad. J. Frank George succeeds M. Manley as treasurer of that property, and W. U. Dabney has succeeded Trainmaster Leach.

Alanson P. Lathrop has been elected president of the Southern Light & Traction Company, New York, N. Y. He is also president of the American Light & Traction Company, which controls the Southern Light & Traction Company.

S. W. Greenland, general manager of the Indiana Service Corporation, has with a number of other leading citizens embarked in a real estate promotion proposition in the southwestern part of Fort Wayne, Ind. It is proposed to establish some large estates for homes.

F. M. Hamilton has been appointed supervisor of insurance of the Chicago Surface Lines. Mr. Hamilton served as claim agent and then as purchasing agent of the railway company in Seattle from 1911 to 1919. After that he went to the Philadelphia Rapid Transit Company and held the positions of freight traffic manager, purchasing agent, superintendent of the department of accident investigation, assistant to general superintendent, assistant to vice-president, and assistant to president. He resigned the last-named position in December of last year.

Young Lady Auditor

Miss Snyder Has Been Made Department Head of Indiana Company Doing Both Railway and Power Business

It is not extraordinary to find a young lady doing essential work around an electric railway office, but it is unusual for a young woman engaged in such work to receive the recognition that accompanies a titled position. Yet that is just what has happened in the case of Florence Snyder, now auditor of the Marion & Bluffton Traction Company, Bluffton, Ind., to which post she was advanced on April 1, this year.

Miss Snyder specialized in commercial subjects in the closing years of her course in the public schools of Bluffton, and in 1913 wandered forth into the world like many another girl before her with her note book and pencil in hand determined to be on her way, but not knowing at the time just where that way might lead. Being well prepared in advance, however, there was no need on Miss Snyder's part for concern as to where that way might lead, and so when it did lead to the office of the local traction company Miss Snyder entered upon her work as clerk with all the assurance that comes from knowing that you know.



Miss Florence Snyder

It is only a step from knowing that you know to having others discover that you know. This was just what James S. Clark, then auditor of the railway, did. Under his direction Miss Snyder developed rapidly her innate qualities for management and the mastery of detail, and so when Mr. Clark was made secretary and general manager of the company Miss Snyder on June 1, 1918, was promoted to bookkeeper and cashier. Any kind of accounting work is exacting in its requirements, but railroad accounting is in some respects even more exacting than ordinary commercial accounting. In the first place, there are the standards to be met which are set down by the industry itself and then on top of this are the exactions of the government, state and local officials.

Besides operating 35 miles of electric railway doing both a freight and passenger business, the road with which Miss Snyder is identified does a lighting and power business so that the work of the accounting department is still further complicated by the need for attention to all the details that go with the billing of such customers and then seeing that they pay their bills. As a consequence of her able handling and direction of all this work Miss Snyder was made auditor. In other words, Miss Synder has advanced through all the various grades from clerk to auditor in less than ten years.

Milo Gipson has succeeded B. A. Bilderback as master mechanic of the Lewiston-Clarkston Transit Company, Clarkston, Wash.

George B. Williams has been relieved of the duties of secretary of the Virginia Railway & Power Company, Richmond, Va. Mr. Williams continues in the capacity of treasurer and E. H. Herrmann is secretary.

Edward J. Peartree, general superintendent of the Trenton & Mercer County Traction Corporation, Trenton, N. J., has been appointed a member of the advisory committee for the drive to secure funds for the Salvation Army.

Obituary

Major Warner of Tennessee

The man who was responsible for the first street railway in the city of Chattanooga, Tenn., died recently at his home in that city, after a brief illness. His name was Major Joseph Henry Warner. He had been retired from active business and participation in public affairs for some time. In 1881 he organized the Chattanooga Street Railway, which took over all the local transportation then existing and composed of a short division of horse railway. Eight years later it was sold to other interests and was followed by the electrification of the system. In 1896 the property again changed hands and Major Warner and associates were in charge, so that almost the entire railway system, up to some twenty years ago, was constructed under his supervision. Although Major Warner was especially identified with the city of Chattanooga, he also was very well known in other industrial, banking and utility sections in East Tennessee.

Peter Rosener, seventy-nine years old, who was the first operator on the Evansville city car lines when mule cars were used, died recently. He was employed by the local company for many years.

A. C. Sharp, Wichita, Kan., one of the oldest electric railway men in Kansas, died recently. Mr. Sharp was a motorman on the city street cars and during his long service had operated cars on every line in Wichita. He was a veteran also of the Spanish-American War.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Safe Walkway Manufacturers to Meet

A meeting of delegates representing the several branches of the safe walkway surface material manufacturing industry will be held at 10 a.m. (daylight saving time) on June 14, 1923, in the board room of the American Society of Mechanical Engineers, New York. After effecting a permanent organization the meeting will consider the preparation of model specifications for the use of materials in such manner that walking safety will be promoted.

The particular points to be considered include: Resistance to slipping, freedom from tripping hazard, durability, flammability, dielectric strength, appearance, and maintenance. Stairs, landings, platforms, ramps, lobbies, door sills, etc., are among the places where special danger exists, and the application of safety devices against slipping in railway stations, and in railway cars, both steam and electric, will receive special attention.

The eight general lines of manufacture to be represented are: Safety treads, abrasive materials, cork, linoleum, etc., lumber, artificial stone, natural stone, metals, and textiles. A national safety code for walkway surfaces is now in process of preparation, and this meeting is called by the manufacturers for discussion of its provisions.

Increased Iron Production in 1922

Figures showing the production and shipments of iron ore, pig iron and ferro-alloys in the United States in 1922 have just been made public by the Interior Department. Considerably more iron ore was mined in 1922 than in 1921. The Chattanooga and Birmingham districts made gains of 126 per cent and 73 per cent, respectively, and the Lake Superior district made a gain of 58 per cent. The Adirondack district was the only one that mined less ore than in 1921. The average value per ton of iron ore at the mines in 1922 was $3.12, which is 25 cents less than in 1921. The stocks of iron ore at the mines in 1922 amounted to 10,524,279 gross tons, a decrease of 24 per cent from those in 1921.

Gains in the shipments of pig iron in 1922 were recorded by every producing state except Virginia, Missouri and Massachusetts. The increases were more pronounced in Kentucky, Tennessee, Michigan, Wisconsin and New York. The general average value for all grades of pig iron at the furnaces in 1922 was $21.98 a ton, a decrease of $2.30 from the value in 1921.

An increase of 70 per cent in the shipments of ferro-alloys is shown for 1922. The shipments of ferro-silicon showed an increase of 181 per cent and those of ferro-manganese an increase of 45 per cent. The shipments of spiegeleisen only slightly exceeded those in 1921. The average value of ferro-manganese at the furnaces in 1922 was $66.04 a ton and of spiegeleisen $30.79 a ton.

Gibbs & Hill Will Oversee Virginian Electrification

The announcement was made this week that Gibbs & Hill, consulting engineers, New York, had been appointed engineers of construction for the entire electrification work of the Virginian Railway. A statement of the electrical equipment to be used in carrying out the construction program in connection with this electrification was published in a recent issue of this paper.

Another Plea for Early Coal Buying

The Joint Fuel Committee, representing the gas, electric light and electric railway associations, has been urged by the Federal Fuel Distributor to cooperate with the government and the railroads to avert a transportation crisis next fall and winter. It is asked that every possible effort be made to store coal during the summer months, so as to stabilize the coal industry and to relieve, so far as possible, the peak demand on the railroads. All member companies are urged to complete their annual contracts for their expected requirements at the earliest possible date, store coal at once to limit of capacity and to unload promptly all coal cars and free the sidings so as to reduce car shortage.

Lumber Prices Are Rapidly Rising

Recent reports of the Department of Commerce indicate that the prices of both hard and soft woods are rapidly rising. Although figures are still below the high average of the year 1920, nevertheless the last few months have shown a steady increase. Speaking generally lumber prices in October, 1922, stood at about the same level as in 1919. The average cost of all woods was very much higher in 1920 than in 1919, but in 1921 came a reaction. Since last fall, however, a steady upward trend has been in evidence, and if the present rate of increase continues lumber prices will soon reach the high peak of three years ago.

Orrin Merry Elected President of Missouri Car Company

Orrin Merry, formerly with the Durant Motors, has been elected president of the Missouri Car Company, St. Louis, Mo., while A. G. Miller becomes treasurer through the change. W. L. McKim, who resigned as treasurer, will continue as a member of the board of directors. The other officers are: Theodore A. Brewster, vice-president; A. H. Palmer, second vice-president; L. J. McKim, secretary, and A. G. Muesenfechter and Dr. W. P. Henrich members of the board. The number of directors of the company has been increased by one.

The company's plant on McCasland Avenue, East St. Louis, is being put into first-class shape and officials anticipate that quantity production will start about June 15. Delay in receiving shipments of important pieces of machinery from Eastern manufacturers has delayed the start of operations more than sixty days. In a measure this delay has been beneficial, for it has been possible to go forward with improvements to the plant. It has also permitted a thorough testing of the machines already received, so that everything will be complete and in tip-top shape when the time arrives to start production.

As has been indicated previously in the ELECTRIC RAILWAY JOURNAL this company plans to make a "non-rollicking" truck for street cars and also to make bus and truck bodies. It is said to possess very valuable patents.

Spanish Electrification to Be Begun This Year

According to *Los Transportes*, published in Madrid, Spain, the electrification of the railroad between Tortosa and La Cava, which has been under consideration for some time, will be begun during the coming summer. The same publication says:

> The construction of the railroad between Santana in Santander, Spain, and the station of Gama in Palencia seems to be an assured fact. Santana is one of the most prosperous towns in Spain. It competes with Vigo in the production of canned products and salted fish, while the oyster-farming industry is very active despite the fact that there has been no railroad communication with the rest of the province, nor with the country in general.

Metal, Coal and Material Prices

Metals—New York	June 6
Copper, electrolytic, cents per lb.	14.962
Copper wire base, cents per lb.	18.00
Lead, cents per lb.	7.25
Zinc, cents per lb.	6.67
Tin, Straits, cents per lb.	42.00
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$6.375
Somerset mine run, Boston, net tons	2.875
Pittsburgh mine run, Pittsburgh, net tons	2.20
Franklin, Ill., screenings, Chicago, net tons	1.825
Central, Ill., screenings, Chicago, net tons	1.875
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$7.75
Weatherproof wire base, N. Y., cents per lb.	19.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$1.15
White lead, in oil (100-lb. keg), N. Y., cents per lb.	13.125
Turpentine, (bbl. lots), N.Y., per gal.	$1.05

Rolling Stock

Butte Electric Railway is putting safety appliances on twenty-two cars so that they may be operated by one man.

Eureka, Calif.—The City Clerk and City Superintendent of Public Works will soon ask for bids for furnishing approximately 20 tons of car wheels for the Eureka Street Railway.

Birmingham Railway, Light & Power Company, as was announced in the May 26 issue of the ELECTRIC RAILWAY JOURNAL, has placed orders for twenty new cars. The specifications of these cars are as follows:

Date order was placed	May 15
Date of delivery	October
Builder of car body	Cincinnati Car Co.
Type of car	Side entrance motors
Seating capacity	62
Total weight	32,000 lb.
Bolster centers, length	32 ft.
Length over all	49 ft. 5 in.
Truck wheelbase	4 ft. 10 in.
Width over all	8 ft. 5 in.
Height, rail to trolley base	10 ft. 6 in.
Interior trim	Cherry
Headlining	Agasote
Air brakes	Westinghouse
Armature bearings (if ball or roller)	Sleeve
Axles	Steel
Bumpers	Hedley Anti-Climbers
Car signal system	Trolley
Car trimmings	Bronze
Center and side bearings	Brill
Control	K 35 KK
Curtain fixtures	Curtain Supply Co.
Curtain material	Pantasote
Designation signs	Hunter
Door-operating mechanism	Air National
Fenders or wheelguards	H. B.
Gears and pinions	Grade M helical 7½ deg.
Hand brakes	Cincinnati
Heater equipment	Consolidated
Headlights	Golden Glow E.SSCD
Journal bearings (if ball or roller),	M.CB type
Journal boxes	Brill
Lightning arresters	G. E. aluminum
Motors, type and number	G. E. 265A (four)
Paint, varnish or enamel	CO, ST.D
Registers	Int. No. 5
Sanders	O.B.
Sash fixtures	Paytori
Seats	Cincinnati (wood)
Seating material	Wood
Slack adjuster	American
Step treads	Feralun
Trolley base	U. S. 13
Trolley catchers	O. B.
Trolley wheels	More-Jones
Trucks	Brill, 76 E.
Ventilators	Railway utility
Wheels (type and size)	26 in. chilled iron

Track and Roadway

Lincoln Street Railway is planning to extend a number of its tracks in the city this summer.

Clinton (Iowa) Street Railway will spend $50,000 for track construction and for paving during the present year.

Cincinnati, Newport & Covington Railway, Covington, Ky., expects to rebuild 2½ miles of track. The work will be done with the company's own men.

Philadelphia, Pa.—Sealed proposals for constructing about 1,529 ft. of two-track subway in Arch Street between Eighth Street and Thirteenth Street will be received at the director's office, Department of City Transit, until June 26.

Pacific Electric Railway, Los Angeles, Calif., will reconstruct its tracks on Pine Avenue south of Sixth Street and double track Third Street between Pine Avenue and American Avenue in Long Beach, according to a promise made by Chief Engineer E. C. Johnson to A. L. Ferver, director of public service.

Texas Electric Railway, Dallas, Tex., is considering an extension of its lines in Denison, and is negotiating with a committee of business men in Denison. It is proposed to extend local street car service about 2 miles west to include the new terminals of the Missouri-Kansas-Texas Railway.

Houston, Tex.—Bids have been called for on the work of grading the track of the Houston, Beaumont & Orange Interurban from Orange to the Neches River. The track will be of 90-lb. rails. Contract for the section between Houston and the Trinity River will be awarded later.

Power Houses, Shops and Buildings

Denver, Col.—The two 10,000 kw. turbines of the Denver Tramway mentioned in the ELECTRIC RAILWAY JOURNAL of May 19 were purchased from the government and will be installed in its steam plant at Denver. The machines are to be ready for operation by Aug. 15, 1923. The installation of these two new units will bring the company's generating capacity up to 30,000 kw., which is sufficient for its needs and it will no longer be necessary to purchase power from a local power company.

Pacific Electric Railway, Los Angeles, Calif., has announced that work will commence soon to improve materially the power conditions on its Los Angeles-San Bernardino line through the installation of additional equipment in the substations at Ramona and Vineland. The new equipment and the alterations and additions to buildings entail an outlay of approximately $100,000. At the Ramona substation an additional 1,000-kw. motor-generator set will be installed, while at Vineland the present 1,000-kw. set will be replaced with an improved 1,500-kw. automatic rotary converter. Additions to the buildings and alterations will be of concrete with steel, fireproof roofs. The installation of additional power facilities is necessary to take care of the present and increasing load requirements on the San Bernardino line. Vineland will be the first 1,200-volt automatic substation installed on the company's lines, as all previous automatic installations have been made in the 600-volt zone.

Trade Notes

H. R. Sargent, formerly manager of the Wiring Supplies Division of the Bridgeport works of the General Electric Company, has been appointed managing engineer of this division under a development plan which will create several unit divisions at the Bridgeport factory.

Westinghouse Air Brake Company-Westinghouse Traction Brake Company have changed the address of their New England quarters to 35 Congress Street, Boston. The personnel has been increased with E. W. Davis, representative in charge; G. H. Martin, representative; C. H. Larimer, mechanical expert; C. D. Brown, industrial representative, and P. L. Bradford, mechanical expert. Charles R. Ellicott is Eastern manager.

General Electric Company, Schenectady, N. Y., has announced contracts for the equipment of fourteen new trackless trollibuses. Nine equipments are for buses to be operated by the city of New York on City Island. They have two GE-258 25-hp. motors each and K69 control. In Rochester, N. Y., five buses will be equipped with two GE-264 25-hp. motors and non-automatic contractor type control. These will be operated by the New York State Railways and are the first to be used in the state outside New York City. The buses will be made by the Brockway Motor Truck Corporation, Cortland, N. Y.

New Advertising Literature

Crouse-Hinds Company, Syracuse, N. Y., has issued Bulletin No. 2001 on flexible fixture hangers and folder No. 2 on vapor-proof condulets with reflectors.

Detroit Stoker Company has just published a new bulletin, "Cutting the Cost of Producing Steam." The bulletin takes up the dollars and cents value of mechanical stokers, dealing with each of the savings effected, in detail. It deals also with the application of advanced engineering principles and modern stoker design, and concludes with a section on the service of the mechanical stoker. Complimentary copies will be forwarded to interested engineers and executives upon request.

National Pneumatic Company, New York, has issued catalog No. 3, which combines several purposes. In the first place it is an excellent catalog, being well illustrated as regards complete equipments and their parts and with lists in which each piece carries a catalog number. This section of the publication includes not only pneumatic door engines an other pneumatic equipment manufactured by the company, but also its full line of equipment for manually operated door and step control. In addition to the catalog features of the publication, there is a chapter on "Remodeled Cars and Safety Cars" of technical interest to the trade, but particularly to those companies considering the best way of modernizing old rolling stock. Facts are also given on the design and construction of the equipment and method of manufacture, with views of the company's works at Rahway.

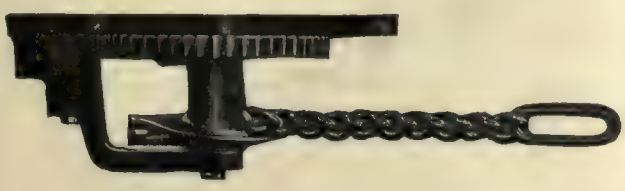


Chicago, North Shore and Milwaukee R.R. Train

Heavy traction men specify them exclusively

Engineering work of the highest class is required on the heavier interurban roads, on rapid transit lines, and on the steam railroad systems. On such work, the more experienced engineers and the more skilled technical experts are employed. Every detail of equipment is most carefully investigated, thoroughly tested and only the most reliable, safe and economical apparatus is specified.

That's why such roads as the Chicago, North Shore and Milwaukee R.R., the New York Municipal Railway (B.R.T. Subway system) and many of the leading steam railroads equip with Peacock Brakes.



PEACOCK IMPROVED BRAKES

1. **Maximum braking power.**
2. **Reserve chain-winding capacity.**
3. **Greatest speed of application.**
4. **The eccentric winding drum**
5. **The automatic stop.**

There is a suitable type for every size car. Let us figure with you on your equipment.

National Brake Company

890 Ellicott Square, Buffalo, N. Y.

Canadian Representative
Lyman Tube & Supply Co., Ltd., Montreal, Can.

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

JOHN A. BEELER
OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT
52 VANDERBILT AVE., NEW YORK

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

J. ROWLAND BIBBINS
Engineer—921 Fifteenth St., WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

JOE R. ONG
Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
PIQUA, OHIO

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Montreal
Philadelphia Los Angeles Rio de Janeiro

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
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HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells John F. Layng Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

WALTER JACKSON
Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

The Baker
Wood Preserving Company
CREOSOTERS
Washington Court House, Ohio

Cross Ties — Bridge Timbers
Lumber — Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.
Engineers and Contractors **SYRACUSE, N. Y.**

STEVENS & WOOD, INC.

Design and Construction of Power Stations
Railroad Electrification, Industrial Plants

REPORTS AND APPRAISALS

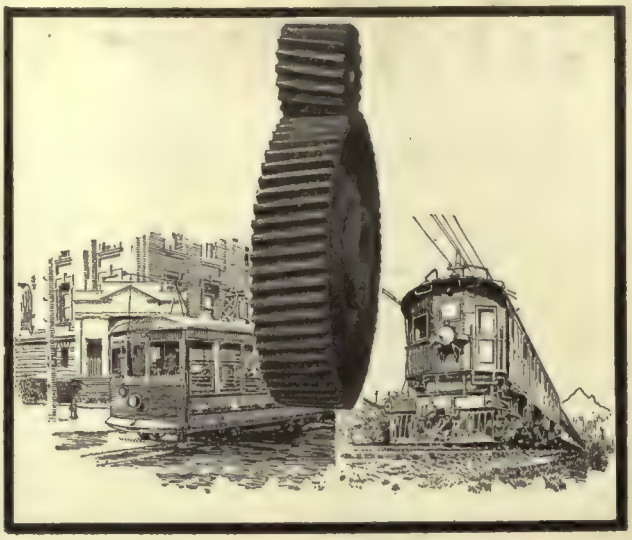
Management and Financing of Utilities and Industrials

Youngstown **New York**

THE P. EDWARD WISH SERVICE

50 Church St. *Street Railway Inspection* 131 State St.
NEW YORK **DETECTIVES** **BOSTON**

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



In every field of electric traction service, from one man safety cars to interurban fliers and trunk line locomotives, Nuttall Helical BP Gears and Pinions are every day proving that they cost one-half less than any untreated spur gears.

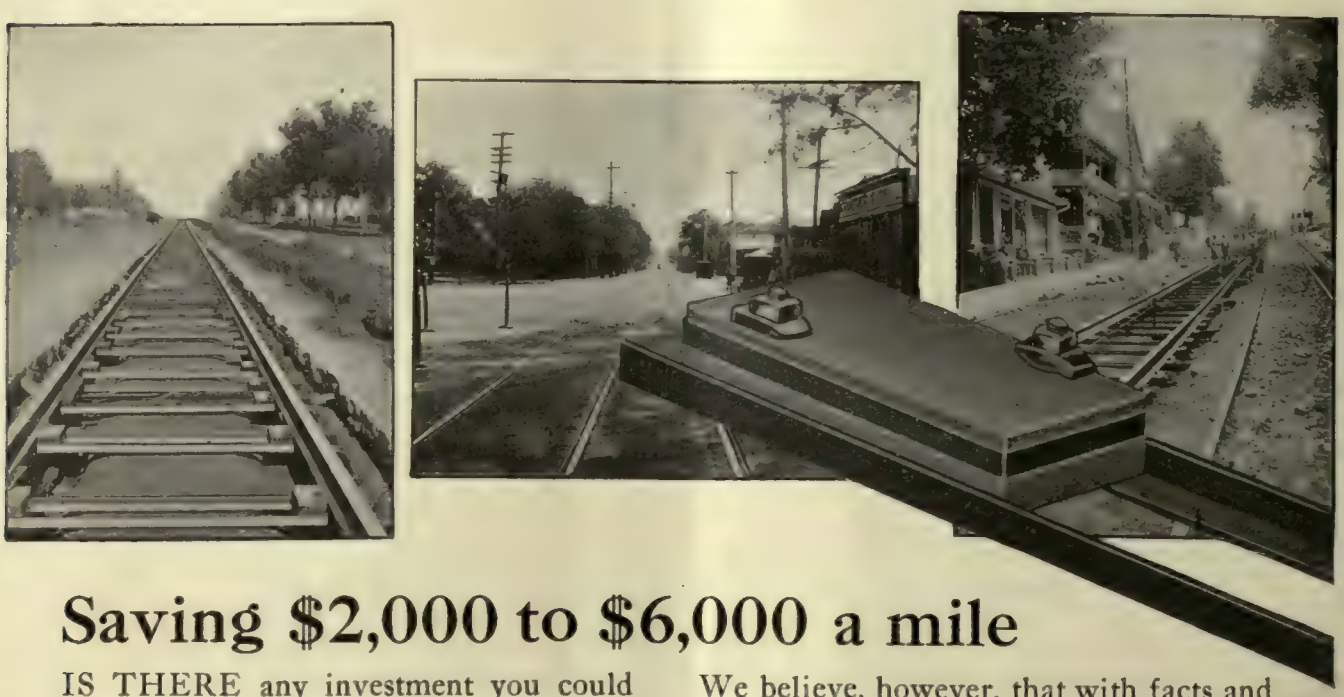


R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Nuttall

No finer tracks were



Saving $2,000 to $6,000 a mile

IS THERE any investment you could possibly make which would pay anything like as large a return?

Think it over in these terms—

A saving of $6,000 per mile over wood ties in concrete!
A saving of $2,000 per mile over wood ties in gravel ballast!
Giving far longer life to the track—
Reducing track and paving repairs—
Reducing upkeep in rolling stock—
Reducing traffic noises.

These are the separate elements of economy which go ino every purchase of Resilient Ties.

The time for track building and track rebuilding is nearly here; thinking in terms of costly wood-tie construction you have perhaps felt that you couldn't afford to undertake construction for which there is real necessity.

We believe, however, that with facts and figures before you on the much lower cost of Resilient Tie construction, you will not only see your way clear to make the absolutely necessary track renewals but can definitely plan for track extensions as well.

These facts and figures as adapted to your particular problems are at your disposal any day you may care to take the matter up with us.

We can show you conclusively where you can put down *better* track for much *less* money than you had any idea of spending. A request for these figures as applied to your particular problems will not put you under any obligation at all.

We want you to know and

IT WILL PAY YOU TO KNOW

DAYTON

ever built

Permanent—Easy riding—Economical, and put in at a saving of from $2000 to $6000 a mile.

Resiliency is the coming thing in track construction.

It's simply the application of the century old principle of shock absorption for dissipating the terrific hammer blows of heavy equipment pounding over a solid foundation. Dayton Mechanical Ties are built on sound principles and are fundamentally correct. That's been proven by the ever increasing number of installations that are going in year after year in every section of the country.





Get all the facts on Dayton *Resilient* Ties. A two-cent stamp now may save you thousands of dollars next month or next year. Let us tell of the experience of dozens of cities who have so successfully used this type of construction.



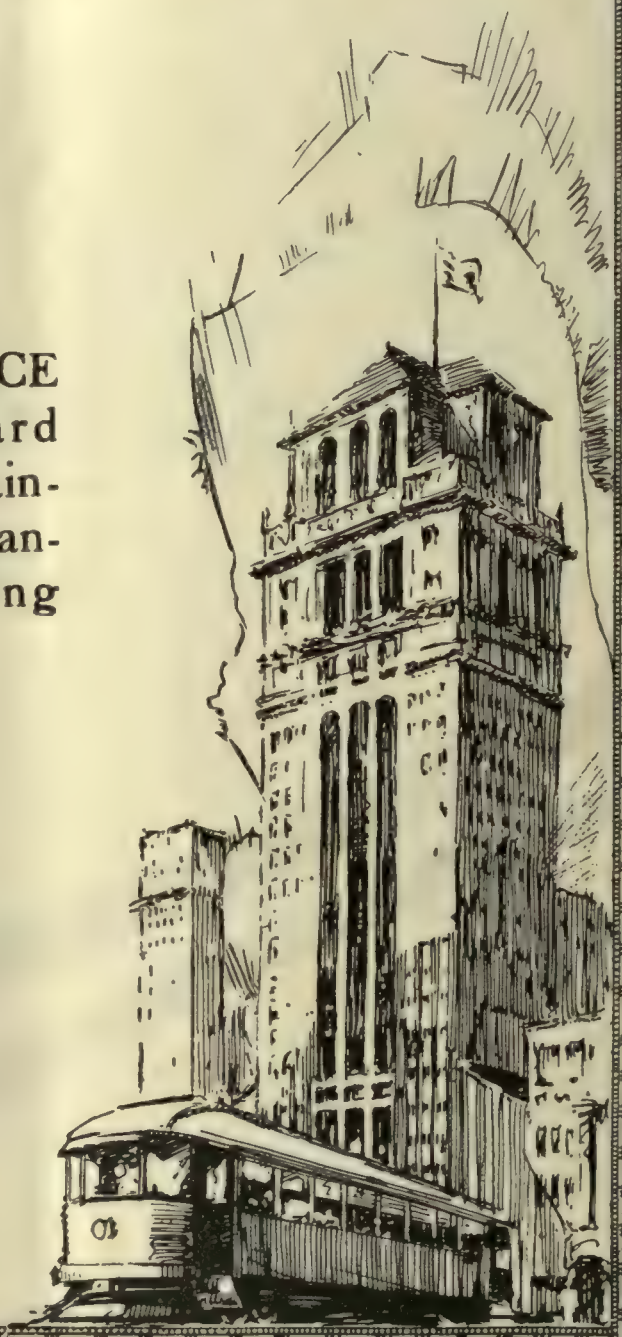
CUSHION
THE SHOCK ON
THE ROLLING STOCK

The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd, Montreal, Quebec



Resilient TIE

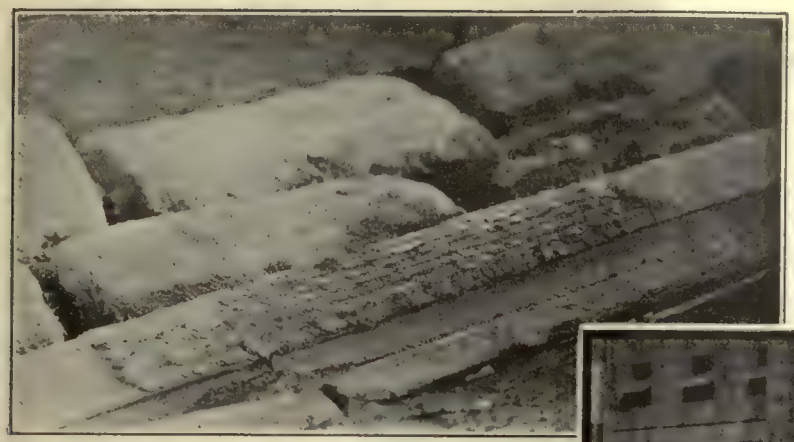
COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE

Barron G. Collier INCORPORATED

CANDLER BLDG. NEW YORK





Built up by

AJAX

Arc Welder

Highest Capacity Resistance Machine

WITH a normal rating of 333 amperes at 600 volts this equipment makes most deeply-penetrating welds. Even at low line voltages, its current output is extremely high—for instance, at 300 volts it will give 200 amperes. A switchboard at one end gives complete current control under all conditions.

Ajax Electric Arc Welder weighs only 155 lbs., and can be easily carried by two men as shown above, loaded on passenger car platforms, and otherwise conveniently handled.

Complete equipment furnished with each machine—trolley contact, leads, switches, electrode holder and operator's hood.

Here is a machine which is not too big or expensive for the smallest road. Its initial cost is small and will soon repay itself in the value of track-work salvaged and prolonged for useful service.

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

30 Church St., New York, N. Y.

AGENTS:

Chas. N. Wood Co., Boston — Atlas Railway Supply Co., Chicago
Electrical Engineering & Mfg. Co., Pittsburgh — P. W. Wood, New Orleans
Equipment & Engineering Co., London, England

Manufacturers of

UNIVERSAL
Rotary Track Grinder

ATLAS
Rail Grinder

RECIPROCATING
Track Grinder

DIAMOND BRAND
Grinding Wheels

Universal Rotary Track Grinder





A Product of Proven Quality
A Manufacturer of National Reputation
A Distributor with National Facilities

Bermico Fibre Conduit is made by the Brown Company with plants at Berlin, New Hampshire.

This Company was founded in 1852. Its management from the first worked to obtain a reputation as producers of a quality output. Once obtained this reputation has been jealously guarded.

The Brown Company has high standards, and specially designed, highly accurate, automatic machinery.

It was natural that the Western Electric Company should join forces and provide the National Distribution such a product needed, for more and more conductors are going underground and conditions require a highly standardized fibre conduit of exceptional physical, mechanical and electrical excellence.

Now Bermico Fibre Conduit is offered the Electrical Industry through our 48 Houses.

Each House is provided with standard quality samples for inspection and test by those interested.

A NATIONAL ELECTRICAL SERVICE

Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

GIVE YOUR PATRONS AN ADDED SERVICE THEY WILL APPRECIATE

The Read-Wyl-U-Ryd System (fully patented) of selling morning newspapers in street cars makes it possible for every one of your passengers to read his morning paper while on his way to work—

2 Years Of Successful operation have proven Its Worth

Any of the following successful street railway managers will glady tell you how the Read-Wyl-U-Ryd service in connection with their local morning newspaper has served them.

T. E. Howell, Gen. Mgr.,
City Railway Company, Dayton, Ohio.

W. E. Bolieau, Gen. Mgr.,
Peoples Railway Company, Dayton, Ohio.

Wm. L. Smith, Gen. Mgr.,
Dayton St. Ry. Company, Dayton, Ohio.

Henry Gebhart, Gen. Mgr.,
Oakwood St. Ry. Company, Dayton, Ohio.

T. A. Ferneding, Gen. Mgr.,
D. S. & X. S. Ry. Company, Dayton, Ohio.

P. E. O'Brien, Gen. Mgr.,
Springfield Ry. Co., Springfield, Ohio.

W. R. Power, Gen. Mgr.,
Ohio Valley Elec. Ry. Co., Huntington, W. Va.

C. D. Porter, Gen. Mgr.,
Newport News and Hampton Ry. Co.,
Newport News, Va.

Chas. C. Johnson, Gen. Mgr.,
Danville Trac. & Power Co., Danville, Va.

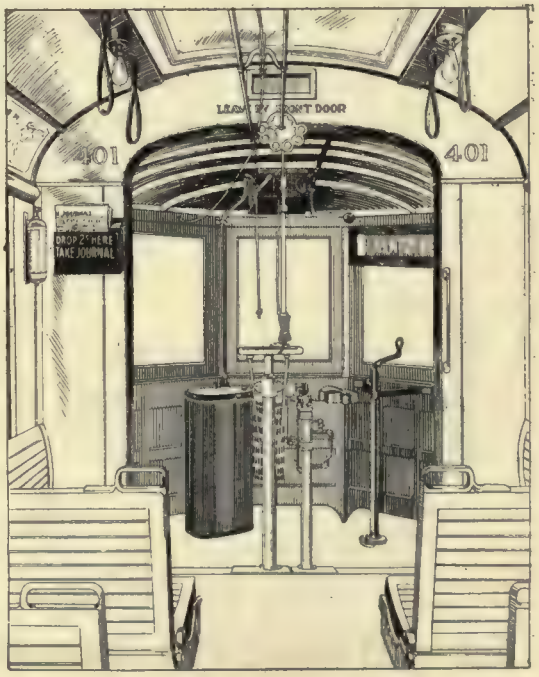
W. F. Raber, Gen. Mgr.,
Southern Colorado Power Co., Pueblo, Colo.

Robert I. Todd, Gen. Mgr.,
Indianapolis St. Ry. Co., Indianapolis, Ind.

H. A. Mullett, Asst. Gen. Mgr.,
Milwaukee Elec. Ry. and Lt. Co., Milwaukee, Wisc.



Note the small size of the device used (above) and (below) its comparative size placed next the fire extinguisher.



U. S. Patent Issued April 11, 1922

Canadian Patent Issued Dec. 26. 1922

Other Patents Pending

READ-WYL-U-RYD

FULLY PATENTED

PATTERSON BLDG. DAYTON, OHIO

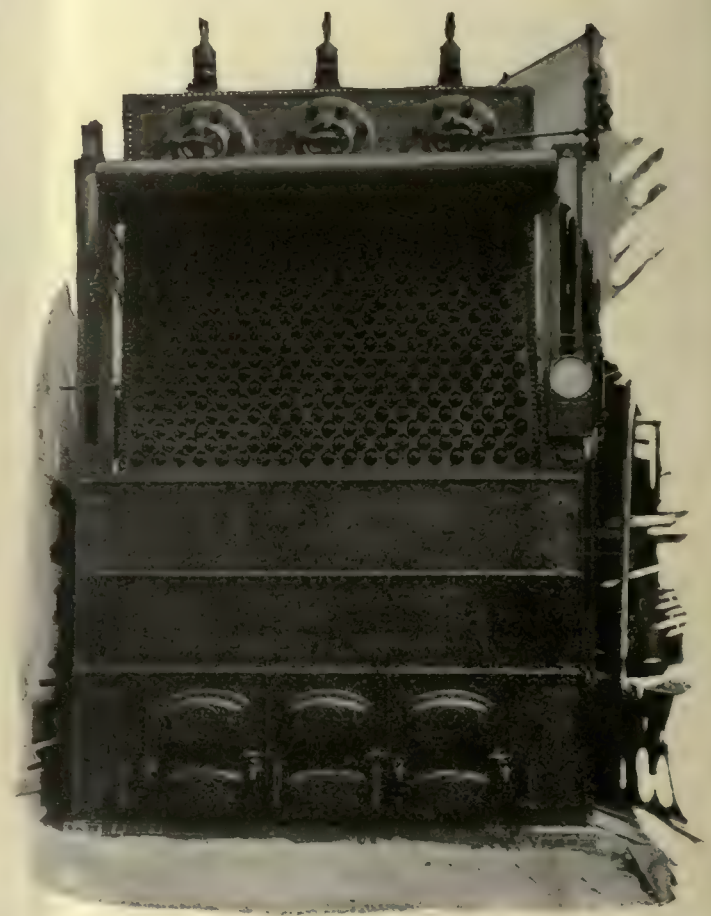
HEINZ 57

THE makers of the famous "57 Varieties" are among the leaders of the food products industry who have selected Edge Moor Water Tube Boilers for service in their power plants.

The illustration shows a 593 H.P. Edge Moor Boiler in the H. J. Heinz Company's plant at Salem, N. J.

Where efficient performance, economy of maintenance, freedom from repairs, and long service are considered essential, Edge Moor Boilers satisfy every demand. Their selection by successful concerns such as Heinz is the result of their exceptional records in a score of leading industries.

The Edge Moor catalogue contains a great deal of information valuable to power plant men. We shall be glad to send you a copy.

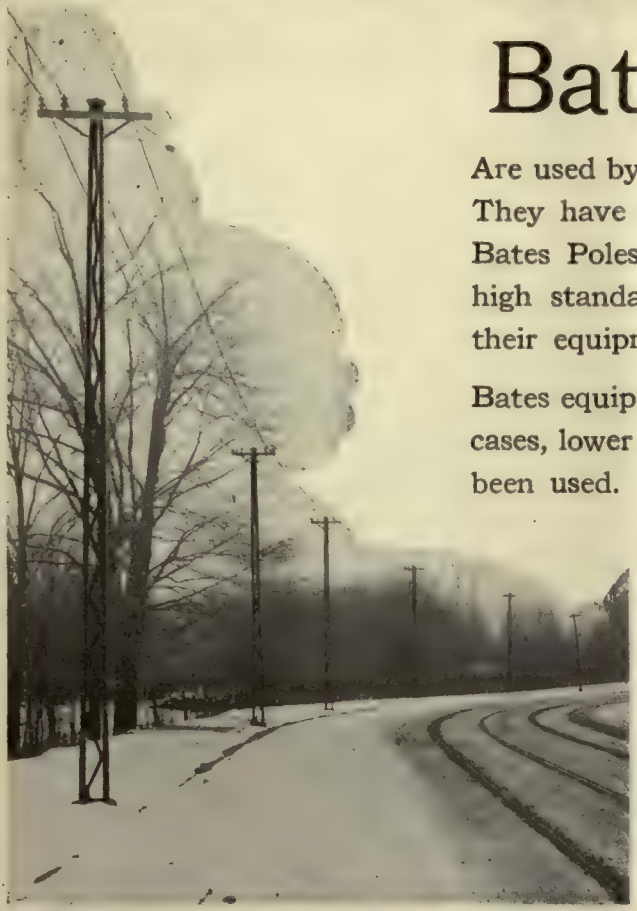


EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE
New York Chicago St. Paul Boston Pittsburgh Charlotte



EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY



Bates Steel Poles

Are used by recognized leaders in the electrical industry. They have found it both logical and economical to buy Bates Poles—poles of a character consistent with the high standard demanded and specified for the rest of their equipment.

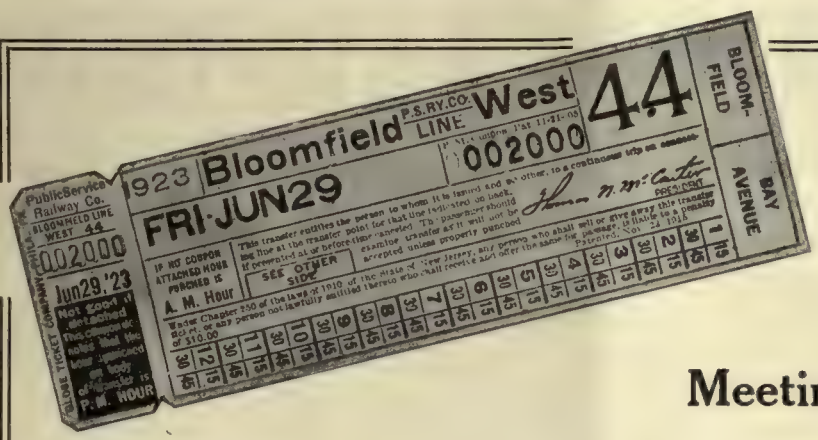
Bates equipped installations have proved, in innumerable cases, lower in initial costs than if substitute poles had been used.

Bates Expanded Steel Truss Co.

ILLINOIS MERCHANTS BANK BLDG.,
CHICAGO, ILL.

Bates Engineers will gladly co-operate with you in your planning.

BATES ONE PIECE EXPANDED STEEL POLES



Meeting Demands

When conditions demand speed in handling the crowds on the cars, Globe P. M. Coupon Transfers will help your conductors through the trying moments.

Globe P. M. Coupon Transfers are primarily intended to help conductors when help is most needed. The P. M. Coupon saves one punch, and the day and date, printed in conspicuous type, saves another. Besides, Globe P. M. Coupon Transfers are so made that the conductor can tell at a glance whether the transfer is right or wrong.

Get the Globe Idea working with your own system, on your cars! It will help you build business.

Globe Ticket Company, 116 N. 12th Street, Philadelphia, Pa.

Los Angeles New York San Francisco

Your Passengers Will Enjoy Their Ride On

Hale & Kilburn Seats

Especially Designed for
One Man Safety Cars



Lightest Weight Stationary Steel Seat

Lightest
Strongest
Simplest
Neatest



Lightest Weight Walkover Steel Seat

No higher in price than others
Write for particulars

Hale & Kilburn Corporation
American Motor Body Company, *Successors*
PHILADELPHIA

New York	Chicago	Richmond	Atlanta	San Francisco	Los Angeles
30 Church St.	McCormick Bldg.	Mutual Bldg.	Candler Bldg.	71 First St.	447 E. 3rd St.

IRVINGTON VARNISHED Cambric



Seven factors of Quality

High Dielectric Strength — Non-Hygroscopic
High Resistance — Heat Resisting
Flexibility — Chemically Neutra
Maximum Elasticity

The Copper and Steel entering into the manufacture of motors, transformers, turbo generators, etc., never wear out. Oil is renewed, but the only factor that can deteriorate is the insulation, and that in many cases has been good for the life of the equipment where Irvington Varnished Cambric was used. It has stood and will stand the test of time. That is why the large manufacturers insist on Irvington. Ask for samples and prices.

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.
Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electric Supply Co., St. Louis
E. M. Wolcott, Rochester
L. L. Fleig & Co. Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

—then they ordered twenty-five (25) more!

St. Louis Quality Cars



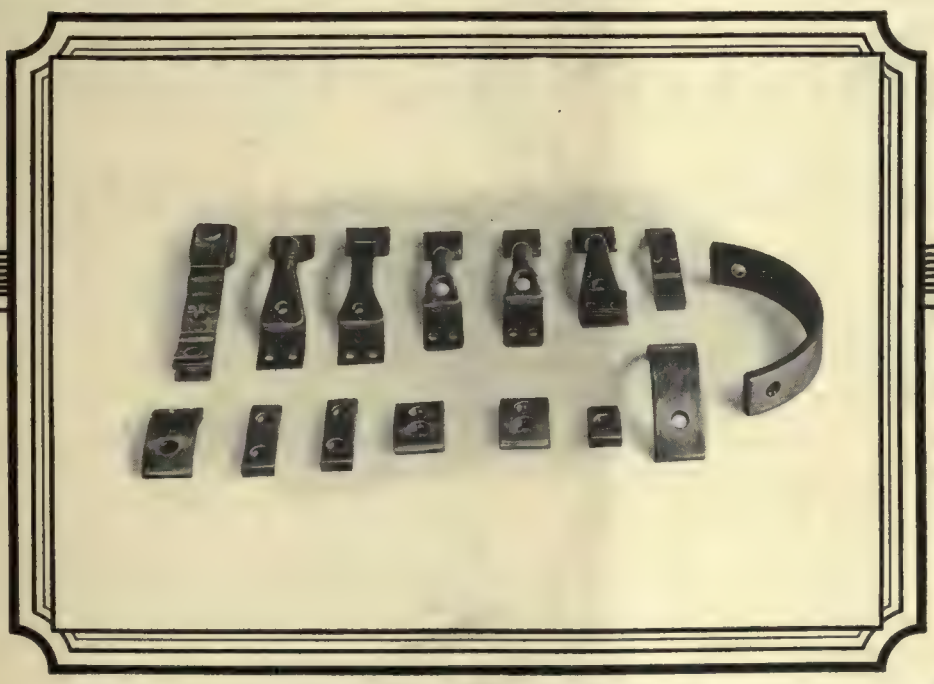
So satisfactory was the service of this type of car on the lines of the Los Angeles Railway that they placed a repeat order, making a hundred and fifty in all.

Let Us Figure on Your New Cars

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"



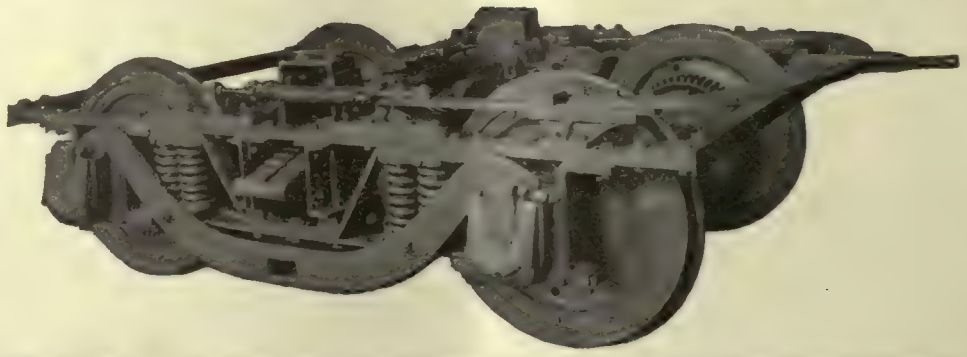
The COLUMBIA Standard Fingers and Segment Burning Tips

—insure good contact with the shunt finger spring

COLUMBIA 1892 MACHINE WORKS

3313 Atlantic Ave., Brooklyn, N. Y.

Baldwin Improved Motor Trucks for Electric Interurban and Street Railway Service



Baldwin Type "A" Truck used on the Osaka Electric Railway and also on the Osaka Tetsudo Railway of Japan. Similar Trucks are used on many American and Foreign Electric Railways.

BALDWIN electric motor trucks are designed and built with the same engineering skill and excellence of workmanship as are Baldwin Locomotives.

We built trucks to meet the most severe conditions of high speed electric interurban and street railways; for use under motor cars on electrified sections of steam lines; for double truck electric locomotives used in switching and local freight service; for the requirements of city and interurban electric freight and express service.

For simplicity, strength, low cost of maintenance and perfect riding qualities, Baldwin Trucks cannot be excelled.

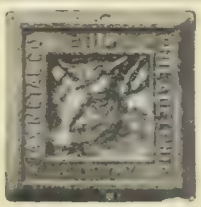
Baldwin representatives in all principal countries of the world.
Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A. Cable Address, "Baldwin, Philadelphia"

The greatest fault with "Tool Steel" gears is that they wont wear out. You must specify us on new equipment — or we will starve!

The Tool Steel Gear and Pinion Co.
CINCINNATI, OHIO



ROLLING STOCK

"that rolls"

USUALLY HAS AXLE BEARINGS

lined with

AJAX BULL BEARING ALLOY

BETTER THAN BABBITT

Wears Longer—Runs Cooler—Costs Less

THE AJAX METAL COMPANY

Established 1880

Main Office and Works: Philadelphia, Pa.

New York Chicago Boston Cleveland

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE and ECONOMY.**

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.

Newtonville, Massachusetts

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNETIC WIRE

Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS

PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg; New York, Pershing Sq. Bldg.

ROME WIRE

BARE AND INSULATED

Rome Merit Wins Customers
Rome Service Holds Them

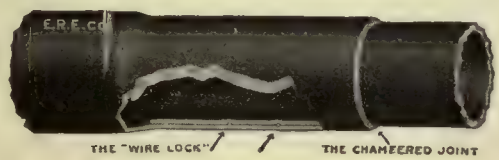
ROME WIRE COMPANY

Main Plant and Executive Offices: Rome, N. Y.
"Diamond" Branch: Buffalo, N. Y.

DISTRICT SALES OFFICES:

New York, 50 Church St. Chicago, Ill., 14 E. Jackson Blvd.
Boston, Mass., Little Bldg. Detroit, Mich., 25 Parsons St.
Los Angeles, Cal., J. G. Pomeroy, 336 Azusa St. 2113-L

ELRECO TUBULAR POLES



COMBINE

Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request

ELECTRIC RAILWAY EQUIPMENT CO.

CINCINNATI, OHIO

New York City, 30 Church Street

OKONITE

TRADE MARK.

Varnished Cambric Wires and Cables

are built to meet the most exacting requirements.

When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes

THE OKONITE CO., Passaic, N. J.

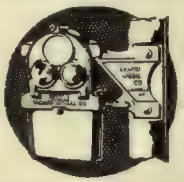
Incorporated 1884

Sales Offices:
New York—Atlanta—San Francisco

Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders



NACHOD SIGNAL COMPANY, INC.

LOUISVILLE, KENTUCKY.

ANACONDA

TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

Peirce Forged Steel Pins
with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company

PITTSBURGH, PA.



INSULATED WIRES AND CABLES

JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY



U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.

West Newton, Mass.

Chapman
Automatic Signals

Charles N. Wood Co., Boston



Shaw Lightning Arresters

Standard in the Electric Industries
for 35 years

Henry M. Shaw

150 Coit St., Irvington, Newark, N. J.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

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UNITED STATES
TWIN TERMINAL
SOLDER
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Arc Weld and Flame Weld

Send for new Rail Bond Book

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Note that the contact surface is in straight line with the wire hole in this



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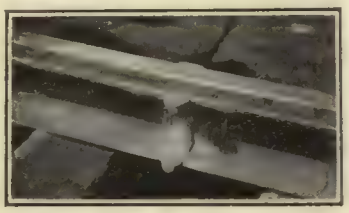
ERICO
Rail Bonds

Brazed Bonds	Arc Weld Bonds
Type ET, Type EA | head of rail	Type AT-F, Type AT-R, Type AU | head of rail
Type EC, web of rail	Type A, base of rail

The Electric Railway Improvement Co.
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An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.



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Steel Castings Gas Cylinders

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Successor
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Automatic Return Switch Stands for Passing Sidings
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Solo or Quartet

USED individually, there are Tribloc to manage any load to 40 Tons; used in batteries of two, three, or four, they take care of loads up to 80, 120 and 160 Tons respectively.

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We make a specialty of

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We solicit a test of TULC on your equipment

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High-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.

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Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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Type R-10

International Registers

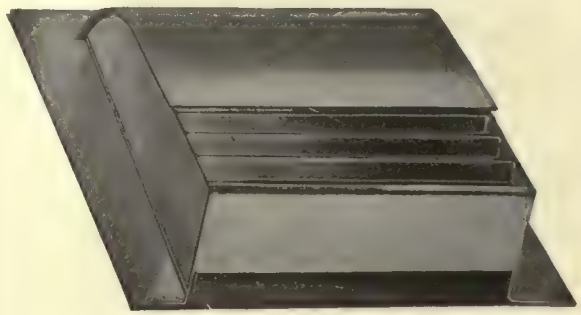
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THE N-L New Style Type C Ventilator is absolutely weatherproof, lies low on roof, looks well and meets every requirement of ventilation.

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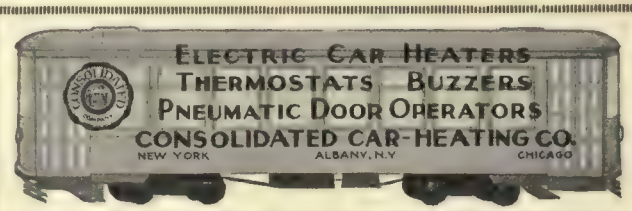
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AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION





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Use them in your Prepayment Areas and Street Cars

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Fare Boxes *Change Carriers*

COIN

COUNTERS SORTERS WRAPPERS

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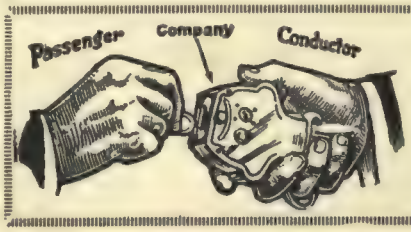
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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company

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Direct Automatic Registration
By the
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Rooke Automatic Register Co.
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RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings.
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

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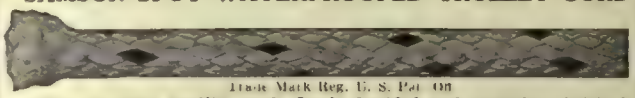


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Sells Transportation

Let our experts on railway car finishing demonstrate Beckwith Chandler paints and varnishes. Write for details.

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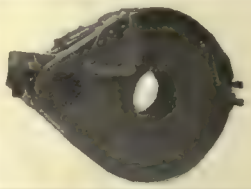


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Samples and information gladly sent

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KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
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in weight, initial and upkeep costs
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One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*
Chillingworth Mfg. Co.
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'CARNEGIE'
When you think of Steel—think of Carnegie

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

SEARCHLIGHT SECTION

FOR SALE
Transformers
3 practically new G. E. Type H, Form RP, single phase, 60 cy. oil cooled distribution Transformers, 150 kva. capacity, voltage ratio 2200-600.
H. T. CARTER, *Agent*
Box 85, Stroudsburg, Pa.

FOR SALE
One Electric Railway Improvement Co.'s
Rail Bonding Car
This car is in good workable condition. Inquiries to be made of Purchasing Department.
San Diego Electric Railway Co.,
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FOR SALE
6 Oil Tank Cars
for electric railways 5,000 gallon capacity. Also half mile of Industrial Track with track scales, turntable, steel ties and 16 steel side-dump cars to go with same at exceptionally low price for quick sale. Wire, phone or write.
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30 MILES
85 LB. RELAYING RAILS
with angle bars
Immediate Shipment
WALTER A. ZELNICKER SUPPLY CO.
St. Louis

ROTARY CONVERTER
1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.
KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

"Searchlight"
is
Quick Action
Advertising
0233

FOR SALE
20—Peter Witt Cars
Weight Complete, 33,000 lbs.
Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control. West. Air Taylor Trucks. R.H. Type. Complete.
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

SEARCHLIGHT SERVICE SECURES SATISFACTORY SALES
2004

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E. R. J.

POSITIONS VACANT

MAN wanted; experienced in the repair and maintenance of electric motors and controllers. Gary Street Railway, 567 Broadway, Gary, Ind.

MASTER mechanic wanted to supervise shop for property operating 40 cars. State age, experience and give references in first reply. Also whether married or single. P-561, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

NIGHT car barn foreman; middle west; 14 interurban, 2 Westinghouse locomotives; must be a willing worker and competent to inspect and supervise; give detail of experience, salary expected and when available in first letter. P-564, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of electrical equipment wanted for small interurban road, in Pennsylvania. Salary $200.00 per month. Address to P-558, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

WORKING shop foreman wanted, familiar with brakes, car wiring and controllers. State age, experience, references and salary expected in first letter. P-554, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ACCOUNTING executive, thoroughly experienced in all branches of large properties: street railway, light, power and gas utility, open for engagement. Capable of assuming full control of all accounting work. PW-543, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MANAGER or superintendent railway, light and power properties, technical, successful organizer and tactful in public relations and very resourceful in rehabilitating properties. Member A. I. E. E. Available in 30 days. PW-557, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

MASTER mechanic wants position with chance for improvement; experienced in cars, locomotives and substation maintenance; platform and multiple unit control, straight and automatic air; building trucks both passenger and locomotives, bodies and rebuilding same. Voltages from 500 to 2000 volts D.C. Would like to make connection with electrified steam road or heavy interurban Railway Company; state complete offer and equipment first letter. PW-565, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

SUPERINTENDENT of transportation with a successful record of 19 years on large properties, desires a change, and solicits correspondence with managers that are in need of a capable, progressive superintendent who knows how to get results and has a record as an economical operator. At present with large property. Personal reasons for making a change. High grade references as to character and ability. PW-559, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

POSITIONS WANTED

SUPERINTENDENT of schedules or transportation; twelve successful years' experience on five different properties as conductor, motorman, supervisor, dispatcher, student instructor, station clerk, chief transportation clerk, and at present successfully building schedules on property operating 900 cars; guarantee to effect most economical, efficient and congenial operation of your present facilities. PW-562, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

WANTED: Position as R. M., supervisor or inspector by man, twenty years on electric railways. Best of references. Available on short notice. Interview. PW-560, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

Wanted Immediately

Four Interurban Cars

All steel or with steel underframes. Seating more than fifty.

W-563, Electric Railway Journal
10th Ave. at 36th St., New York City.

1500 Tons

85 lbs. A. S. C. E. Section

Relaying Rails

with Angle Bars

Immediate Shipment

Central South and Southwestern delivery

S. W. LINDHEIMER
1st National Bank Bldg.
Chicago, Ill.

Rails and Track Material

Additional Searchlight ads on Opposite Page

25-cy. Motors, Transformers, Motor Generator Sets

Over 1200-25 cycle motors, three-phase, totalling 15,000 hp. in sizes from 1 to 750 hp., various speeds.

Single- and three-phase 25 cycle transformers, from 1 to 200 kw. Frequency Changer Sets 25 to 60 cycle.

1— 500 kva. G. E.....$ 6,300
2—1250 kva. Westinghouse..... 11,800

Prices quoted F. O. B. cars Kansas City, Mo.

All 6600 volt on 25 cycle end and 4150 volt or can be reconnected 2400 volt on the 60 cycle end.

Prices subject to change without notice and subject to prior sale. Many items almost new and all were in operating condition when removed from service.

This equipment on hand due to a recent change from 25 to 60 cycle distribution.

For details and prices, address

Kansas City Power & Light Company, Kansas City, Mo.

Attention: W. C. BLAIR, Industrial Engineer

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Western Electric Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Electric Service Sup. Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.

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Columbia M. W. & M. I. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Br. & Metal Co.

Babbitting Devices
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Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The

Bearings an Bearing Metals
Ajax Metal Co.
Baldwin Locomotive Works
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Le Grand, Inc., Nic
Westinghouse E. & M. Co.

Bearings Center and Roller Side
Stucki Co., A.

Bearings, Roller
Stafford Roller Bearing Car Truck Corp.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Western Electric Co.

Boilers
Babcock & Wilcox Co.
Edge Moor Iron Co.

Boiler Tubes
Edge Moor Iron Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.
Western Electric Co.

Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Western Electric Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties Posts, etc.)
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Electric Ry. Equip. Co.
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Hubbard & Co.
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National Ry. Appliance Co.
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Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
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Brill Co., The J. G.
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Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
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Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

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General Electric Co.
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Le Carbone Co.
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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings
National Vulcanized Fibre Co.

Bushings, Case Hardened and Manganese
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Bus Seats
Hale & Kilburn
Heywood-Wakefield Co.

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Cambric, Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes Carbon)

Car Lighting Fixtures
Electric Service Sup. Co.

Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.

Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.

Cars, Gas Rail
St. Louis Car Co.

Cars, Passenger, Freight Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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Catchers and Retrievers, Trolley
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Circuit Breakers
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Electric Service Sup. Co.
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Electric Service Sup. Co.
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Cleveland Fare Box Co.

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Samson Cordage Works
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International Steel Tie Co.

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Ramapo Ajax Corp.

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Ohio Brass Co.

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Allis-Chalmers Mfg. Co.

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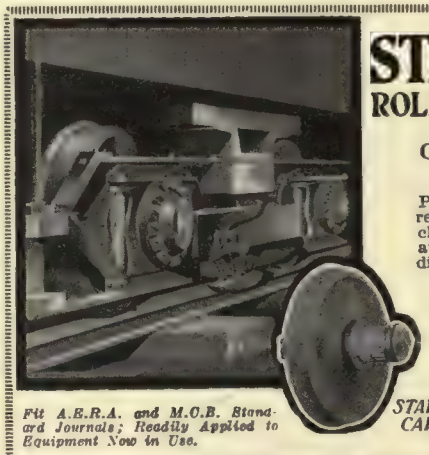
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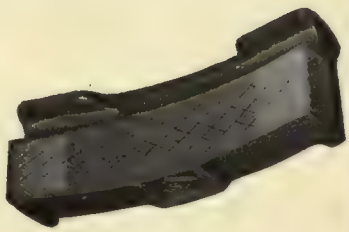
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A. STUCKI CO.
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Northern **CEDAR POLES** Western

We guarantee
all grades of poles; also any butt-treating specifications

BELL LUMBER COMPANY
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"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
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Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardener pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

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The Consolidated Car Fender Co., Providence, R. I.
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General Sales Agents



Double-Truck Safety Car

Mounted on Brill Low-Level Trucks No. 77-E

In this double-truck type Safety Car are combined the advantages of light weight and a carrying capacity equal to the requirements of practically any service. It weighs approximately 28,000 lb. complete, and has a seating capacity of 54.

Also, Brill 77-E trucks equipped with 26-in. diameter wheels not only carry the car body very low but operate in a steady and most comfortable manner.

Complete information will be furnished upon request.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND OHIO — WASON MANF'G CO. SPRINGFIELD MASS.

G-E Electric Switching Locomotives



CHICAGO, ILL.



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NEW YORK, N.Y.



NEW YORK, N.Y.



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DES MOINES, IA.

YOUR guarantee of satisfactory operation from a G-E Switching Locomotive is embodied in the fact that since 1895—the birth year of railway electrification—we have been producing electric locomotives adequate for any service and of well balanced mechanical and electrical design. Operating records are available.

With this experience as a foundation, our ability to furnish switching units which will meet your requirements is unequalled.



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ELECTRIC RAILWAY JOURNAL

June 16, 1923



2272 MILES

Track Reconstruction in San Diego

Steel Tie Construction Used as Standard—Weather Conditions Permitted Work to Be Carried on Actively During Recent Months

DURING the past few months several interesting track reconstruction jobs have been done by the San Diego Electric Railway, notably the Adams Avenue and the University Avenue-East San Diego lines.

The Adams Street line is the one on which the track was torn up during the night last summer by the company's track forces as the climax of a long controversy between the city officials and the company over paving and other matters of dispute. After a court battle, a compromise was reached through the mediation of the State Railroad Commission, and reconstruction of the line was begun. The line will be double-tracked throughout its length to the end at Kensington Park, outside the city limits. Service was resumed on the line Dec. 23, 1922, although it was but partially completed at the time. This was a great relief to the patrons, who had been depending upon uncertain bus service, which could not be maintained in rainy weather because the adobe soil, used for roadway in the unpaved streets, is sticky and slippery when wet.

The reconstruction work was carried out in accordance with the standards adopted by the company for all recent construction. The track construction comprises the use of twin steel ties, spaced 6 ft. center to center, with 93-lb. high T-rails for all straight track, 114-lb. rails for curves and 127-lb. guard rails for all special trackwork. All joints are electrically welded and the rails are electrically welded to the ties. All special trackwork is bonded with 350,000 circ.mil cable, and the welded tracks are cross-bonded every 500 ft. with cable of the same size.

(Continued on page 7 of Advertising Section)

The carefully weighed decision in this instance was based on data showing economies in first cost and track life.

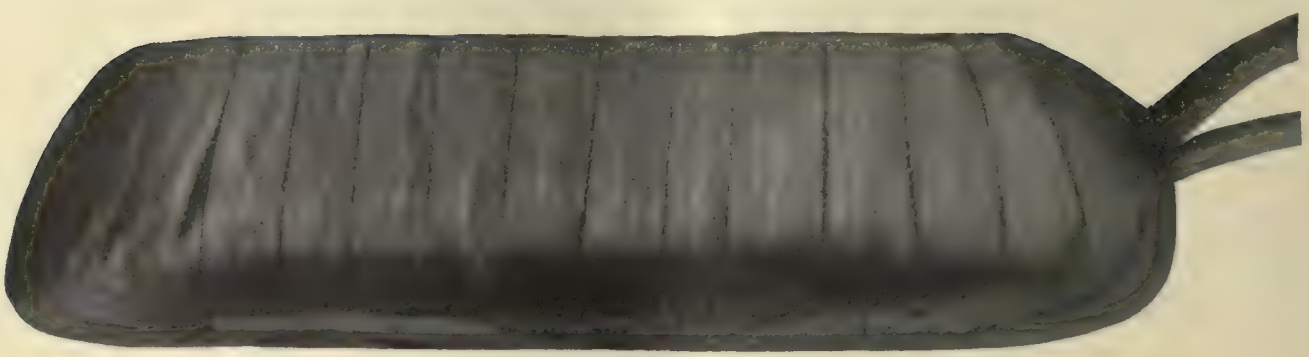
May we send you any, or all, of the following:—

Catalogue, Drawings, List of Users, Delivery Date, Prices on your job, Estimates, Track Cost Data?

The International Steel Tie Co.
Cleveland

This article is reprinted from the Electric Railway Journal, issue of April 28, 1923.

Steel Twin Tie Track





Impregnating Tank for treatment of Field Coils

How the Quality of Westinghouse Field Coils is maintained

Westinghouse Field Coils, sold for renewals, are made with the same expert workmanship, with the same materials, and under the same processes as the original coils entering into the construction of complete Westinghouse Motors.

Copper conductors of correct size are always used, thus assuring the right current-carrying capacity. The exact number of turns are used, assuring the proper magnetic field strength.

The insulation is reinforced at all bends and cross-overs to give added protection. The cable leads are anchored inside the coils, making the use of heavy brass terminals unnecessary.

The coils are carefully gauged to assure the proper clearance in the frame and a snug fit on the pole. Each coil is tested for short circuits.

After the first taping the coils are impregnated with a gum of high melting point to make the coil one solid mass. This treatment consists of drying out the coils in a vacuum, thereby removing all moisture as well as all air. The hot gum is then admitted to the coils under pressure, which assures that the gum penetrates and fills all intervening spaces between the turns and layers of the coils.

The coils are then given three layers of treated cambric, one-half overlapped, and an additional layer of cotton tape slightly overlapped. After this coils are dipped in a high-grade insulating varnish and baked for a definite period. This treatment is repeated three times. This further seals the coils against the entrance of moisture.



Testing Westinghouse Field Coils



Guaging Westinghouse Field Coils

W WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

Westinghouse

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Survey of experience and opinion discloses apparent swing back to protected storage, though it is difficult to justify the investment on a basis of tangible savings. This explains the use of open type in practically all recent construction.

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BY C. W. PRICE.
Newspaper publicity proved a most effective method of making the public realize the personal feature of the safety campaign. Signed articles by prominent persons, news items and cartoons are used advantageously.

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BY HOWARD H. GEORGE.

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Complete and convenient records speed up inspections and repairs. The maintenance practices of a small company which keep the number of cars out of service to a very small percentage.

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Keeping Abreast

AT A RECENT meeting of one of the important committees of the American Electric Railway Association, engaged in the investigation and standardization of electric railway material, the sponsor asked for the last issue of ELECTRIC RAILWAY JOURNAL. When it was brought he turned to a certain article and said:

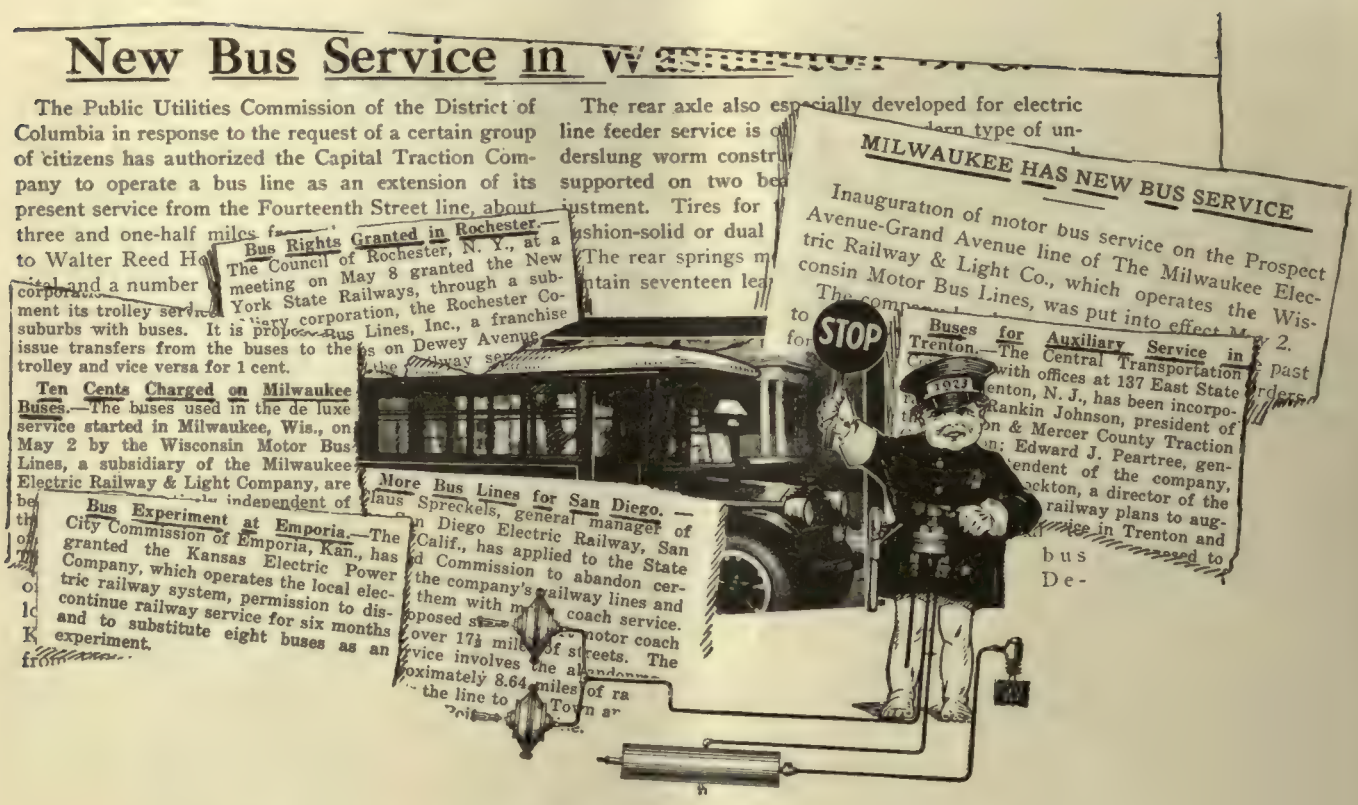
"Gentlemen, a new development is described here which I think this committee should investigate and determine its value. It seems to me that this is an improvement in construction which may be of greatest importance in our future work."

This is not an isolated case; it is a circumstance that occurs frequently. The JOURNAL is the clearing-house of ideas for electric railway men. Not only are new developments in the industry mentioned in its pages, but they are described in all the detail they seem to warrant and their application and significance pointed out.

This is another reason why every electric railway man must have the JOURNAL and use it in order to keep abreast of developments and have the knowledge at hand on occasion for the advancement of his own company—and himself.

Circulation of this issue, 7,050

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SAFE Bus Operation

THE widespread adoption of motor buses by street railway companies, for auxiliary service, brings before the traction industry the necessity of bus-braking facilities that will correspond in safety to those which have contributed so largely to the success of the street car.

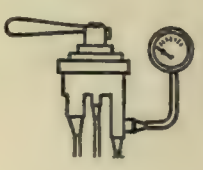
Such facilities have been provided in the form of the Automotive Air Brake.

The Automotive Air Brake carries out the principle of the standard Westinghouse Air Brake in fundamental design and operation, and is applicable to any type of bus.

Hundreds now in service attest to highly dependable, satisfactory performance under any condition of load or road.

For further details, write or wire—

Westinghouse Traction Brake Company
Automotive Division, Wilmerding, Pa.



WESTINGHOUSE
AUTOMOTIVE AIR BRAKES



National Trolley Guard is an inverted copper or galvanized iron wire mesh mounted above the trolley wire. It catches the trolley wheel, should it leave the wire and being energized carries the car to safety.

They decided on National Trolley Guard for this Crossing

THIS is rather an uncommon combination of circumstances at a railroad crossing. Street Railway, Elevated and Steam Road meet. The ordinary hazard of a crossing was made worse by the high stringing of the trolley wire. The danger of damaging the trolley pole on the elevated structure lessened the chances of the street car conductor getting the trolley wheel back on the wire, should it fly off with a locomotive approaching. The railway officials "took out" safety insurance to overcome this condition. They installed National Trolley Guard.

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus Marsh & McLennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & McLENNAN

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Cleveland

Winnipeg
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Continued from Front Cover

A reprint from Electric Railway Journal of April 28, 1923



Soft Spot in Adobe Soil, Filled in with Broken Concrete Preparatory to Laying of Track Structure



Electrically Welded Joint as Used in San Diego Electric Railway Standard Track Construction

The trench for the track is excavated approximately 18 in. deep. Two feet outside the outside rails a trench is excavated 12 in. below the sub-grade and in it is laid a 4-in. concrete drain tile. The trench is then filled with crushed and disintegrated granite to within 14 in. of the grade.

The rails are set on concrete pyramid-shaped piers spaced 12 ft. apart and are adjusted to exact grade by means of double cast-iron wedges placed between the rail bottom and the top of the piers. When they are finally adjusted the rails are firmly braced in place and a 14-in. layer of concrete is poured. The concrete is worked up against the under side of the head of the T-rail, but the balance of the concrete surface is left 2 in. below the street grade to allow for paving.

On Adams Avenue the Company has been relieved of the paving obligation. The track is, therefore, being surfaced with disintegrated granite, a material which is plentiful locally, and which makes a good roadway.

The reconstruction of the University Avenue-East San Diego line presented considerable difficulty due to the heavy traffic, the heaviest in the city, which it carries. The problem was solved by reconstructing one track at a time from Park Boulevard to the end of the line in East San Diego. A block signal system was installed to facilitate dispatching, and dispatchers with extra telephones were stationed at the turnouts where the eastbound and westbound cars are passed. Trains of two cars each were operated during the rush hours and a fourteen-minute headway was maintained, with extra tripper service added.

One of the special problems encountered by Engineer H. M. Kuehmsted, who was in charge of the work, was the caring for soft spots in the adobe soil. Generally these were caused by leaky water mains. The difficulty was overcome by excavating the soft soil until firm soil was reached and filling up to sub-grade with broken concrete.

The first work done by the San Diego Electric Railway under the new specifications was the reconstruction of the Broadway line from the Union Depot to Third Street, which was followed by the reconstruction of the Logan Avenue line, beginning last May. This work was described in the ELECTRIC RAILWAY JOURNAL at the time. Then came the Adams Avenue and University Avenue jobs, which will be followed by the construction of the Park Boulevard line, work on which is now due to begin. Then will come the new construction of the Sixteenth Street cutoff and the reconstruction of the Market Street line.



Track Reconstruction on Adams Avenue, San Diego, Showing Method of Supporting Track Previous to Pouring of Concrete



New and Old Track Construction on Adams Avenue, Showing Special Trackwork Near Carhouse

An advertisement—

The International Steel Tie Co., Cleveland



ELRECO

COMBINATION POLES

Ornamental and Economical

To put the finishing touches of adornment on that new bridge or highway, install Elreco Combination Railway and Lighting Poles. Avoid the mistakes of former years, whereby otherwise fine-appearing streets and avenues have been cluttered up with a veritable forest of wooden poles and a maze of electric wires. Combine your railway and lighting poles in one — Elreco Poles. It is an artistic as well as a sound economical policy to follow.

Elreco Poles are provided with the finest G. E. Novalux lighting fixtures. Elreco Poles are strongly built, yet light in weight. Their initial cost is reasonable, their maintenance cost a minimum.

Let us send you all the data

The Electric Railway Equipment Co.
Cincinnati, Ohio
30 Church St., New York

For Modern Car Lighting—

Install

KEYSTONE COMPENSATING FIXTURES



Rather than install or continue to operate several circuits of small lamps in your cars you will find that great savings can be made by using Keystone Compensating Fixtures.

You simply replace the several circuits of small lamps with one or two circuits using Keystone Compensating Fixtures. You will then realize that the advantages, which are briefly as follows, will pay a handsome dividend on your investment:



The cost of lamp renewals will be greatly reduced.

Fewer lamps will be stolen.

Burned-out lamps can be located immediately.

Will improve appearance of car and lessen glare.

Better illumination for given total wattage consumption.

Greatly simplified car lighting.

As an investment, Keystone Compensators are a real buy. May we give you further data?

Put your car lighting problems up to us.

Keystone Compensating Fixture is a patented device and has been thoroughly tested in service. You will make no mistake in adopting this method of car lighting.

ELECTRIC SERVICE SUPPLIES COMPANY

ELECTRIC SERVICE SUPPLIES Co

Manufacturer of Railway Material and Electrical Supplies

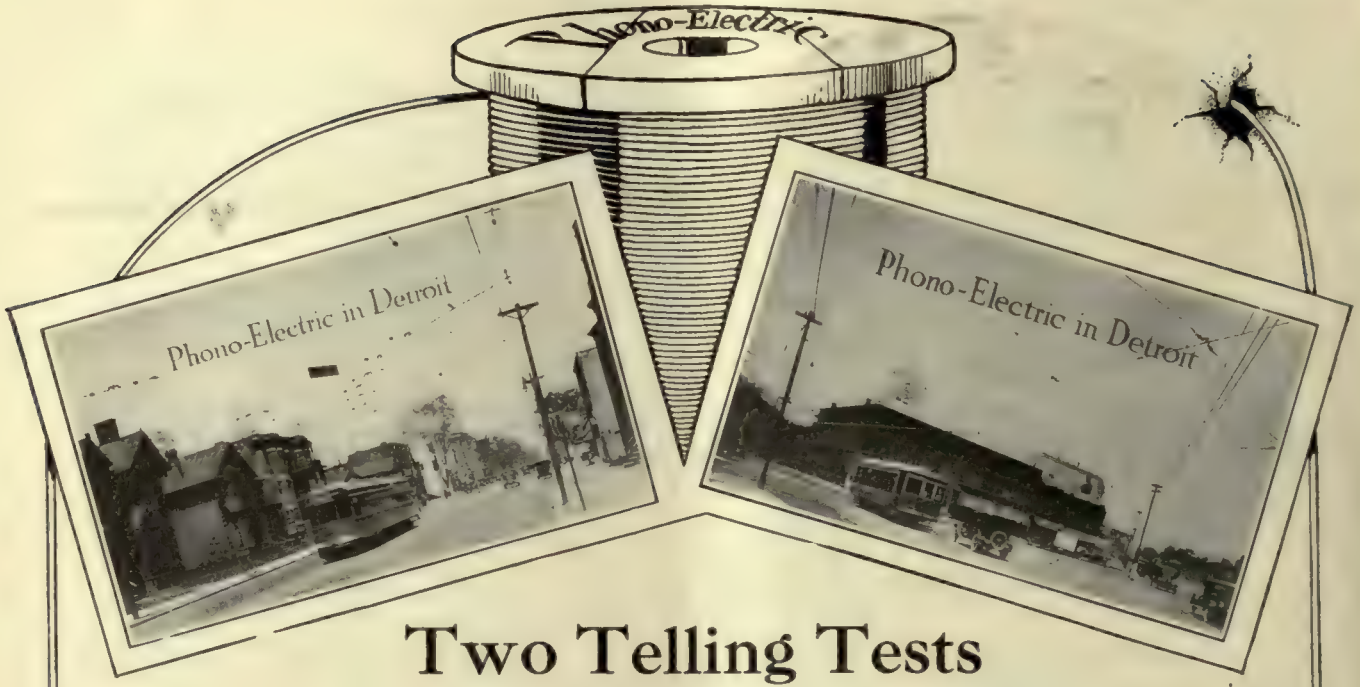
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From Aug., 1921, to Dec., 1922, copper trolley showed a reduction in area of 6.64% while Phono-Electric under identical service showed only 3.91%.

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Called in to investigate the City-owned system, a well-known consulting engineer recommended the use of long-life alloy wire. Here are some quotations:

"Throughout the country the use of alloy wire at locations of exceptional wear is the rule and not the exception.

"Such wire costs a little more than copper, but is good for double and even triple life.

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Phono-Electric will prove equally satisfactory and economical on your system. Write us for further information and for quotations.

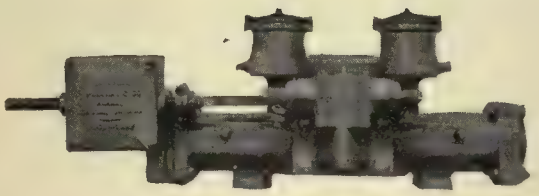
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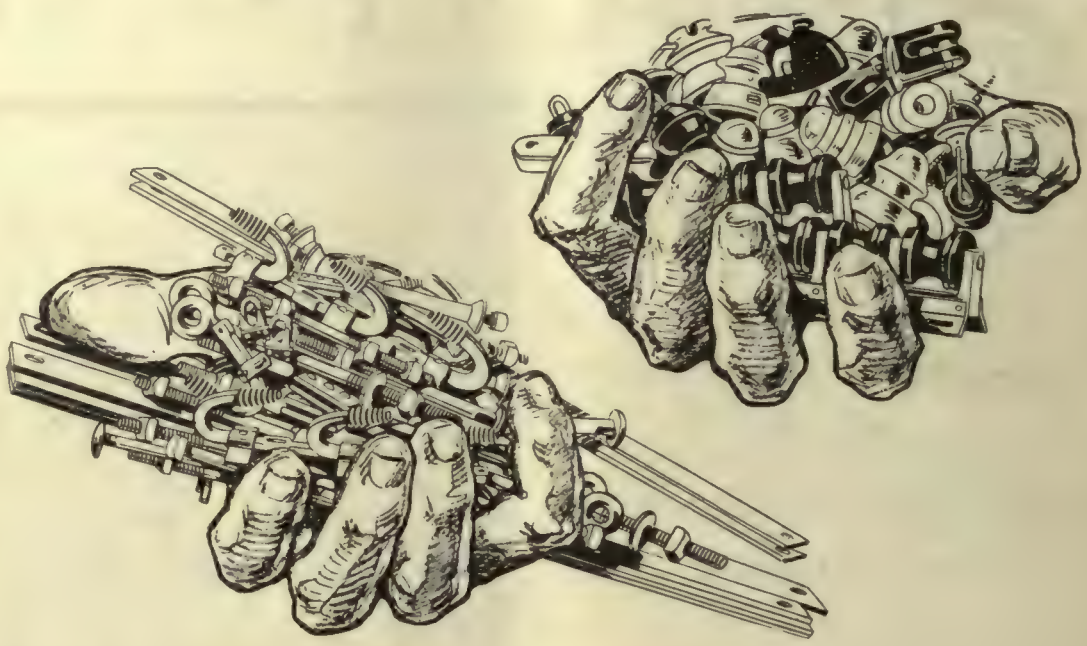
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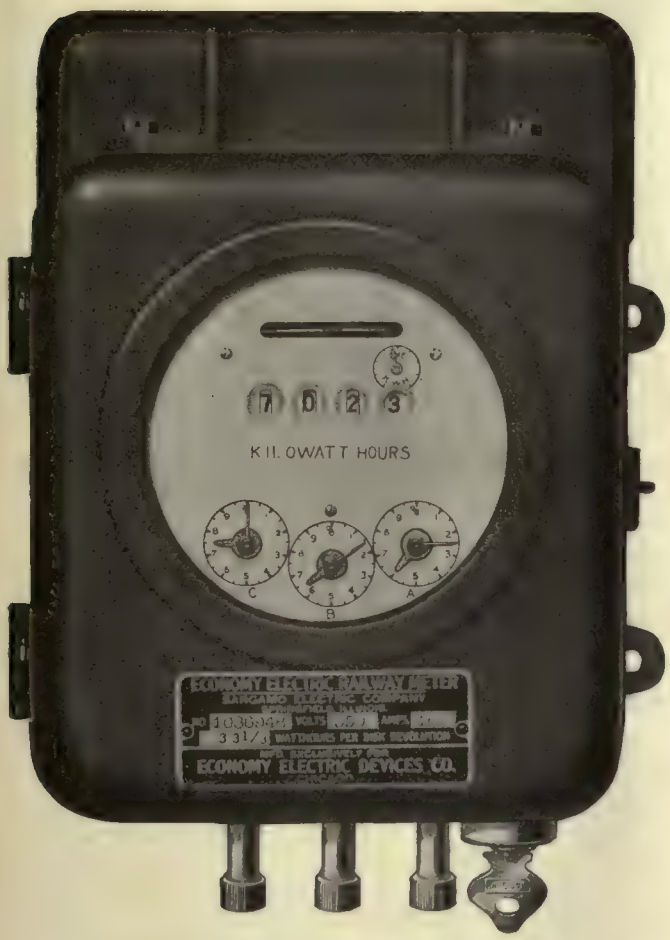
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With Car Inspection Dials

To Completely Equip Entire System



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These meters will be used to measure the individual energy consumption of every car on the San Antonio Public Service Company's property. They will afford data of high engineering value and provide a convenient means for car inspection on the basis of actual work done (Kw. hours).

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The Economy meter with car inspection dials is readily adaptable to any electric car or locomotive operating condition.

It is a "power-saving device" with a double value.

Let us quote you prices and answer detailed questions.

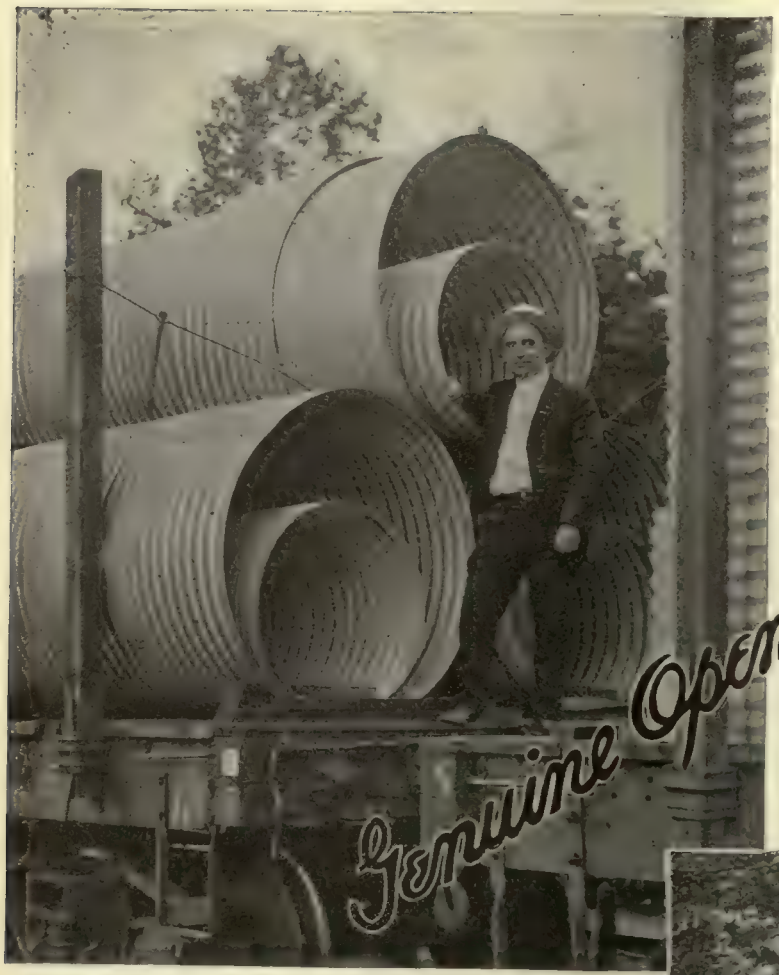
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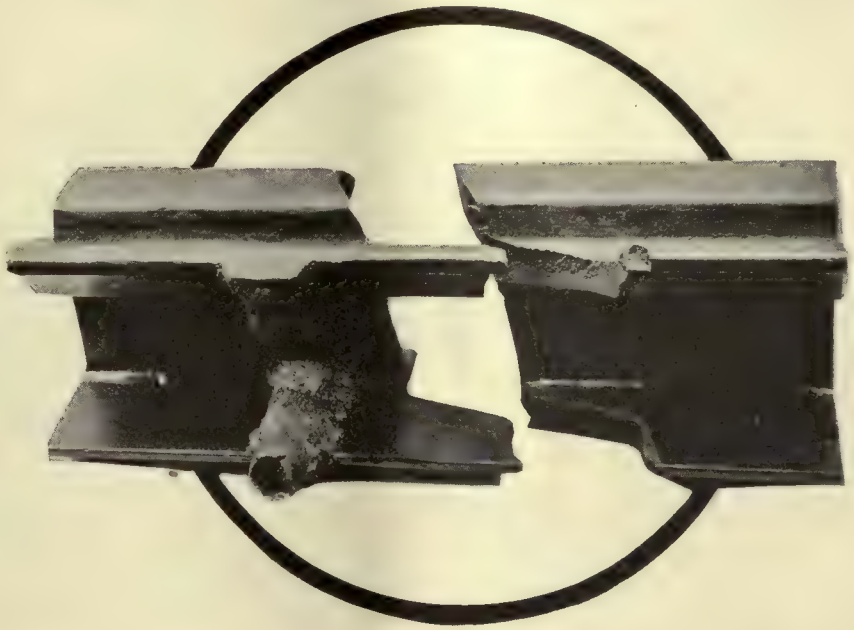
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Stronger than the rail itself

Why railway companies are getting such satisfactory results with Thermit Welds is well illustrated by this experiment, recently made by the engineers of the Washington (D.C.) Railway & Electric Co.

The Thermit Weld
withstood this severe test

Bent in the testing machine under a relentlessly increasing pressure *applied directly to the side of the weld* the tortured rail finally broke as shown, entirely outside of the weld itself.

Thermit Rail Welds are practically indestructible. They entirely eliminate the joint, making a perfect, permanent connection, both mechanically and electrically, a connection which lasts as long as the rail itself.

"The first cost is the last cost"

Write for interesting figures on that first cost.

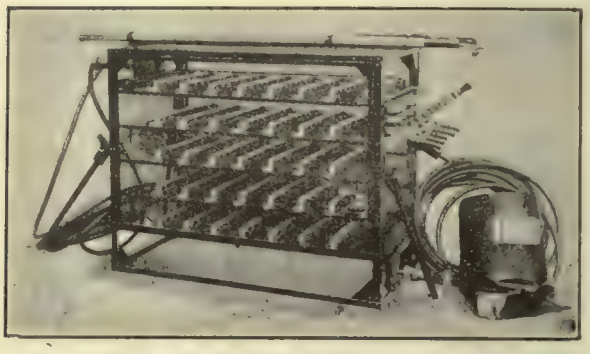
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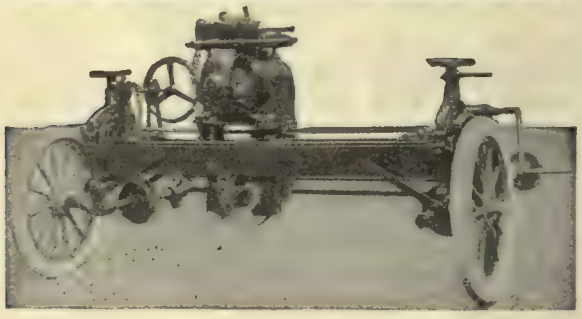
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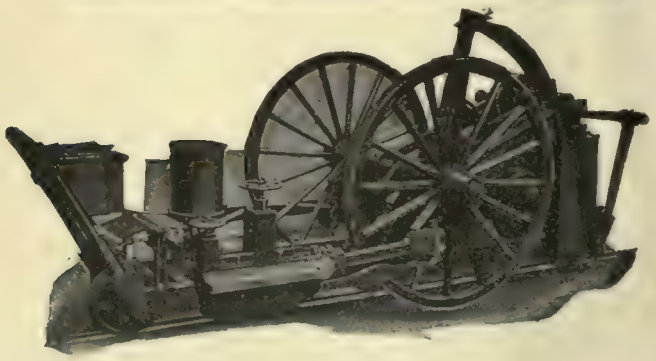
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These equipments have been chosen by 439 Companies in every State and almost every country of the civilized World to secure smooth-running track and reduce maintenance costs.

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The most modern welder on the market, designed for the reclamation of rails and special work at lowest cost. Light, rugged and simple, it is especially adapted for the usual track crew organization.

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The lubricant of unfailing service. Yields greatest mileage and practically eliminates hot bearings.

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The finest cylinder lubricant made. Manufactured from selected stocks by exclusively Galena process. Has won a world-wide reputation.

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There is a time-tried and service-tested Galena lubricant for every Electric railway requirement.

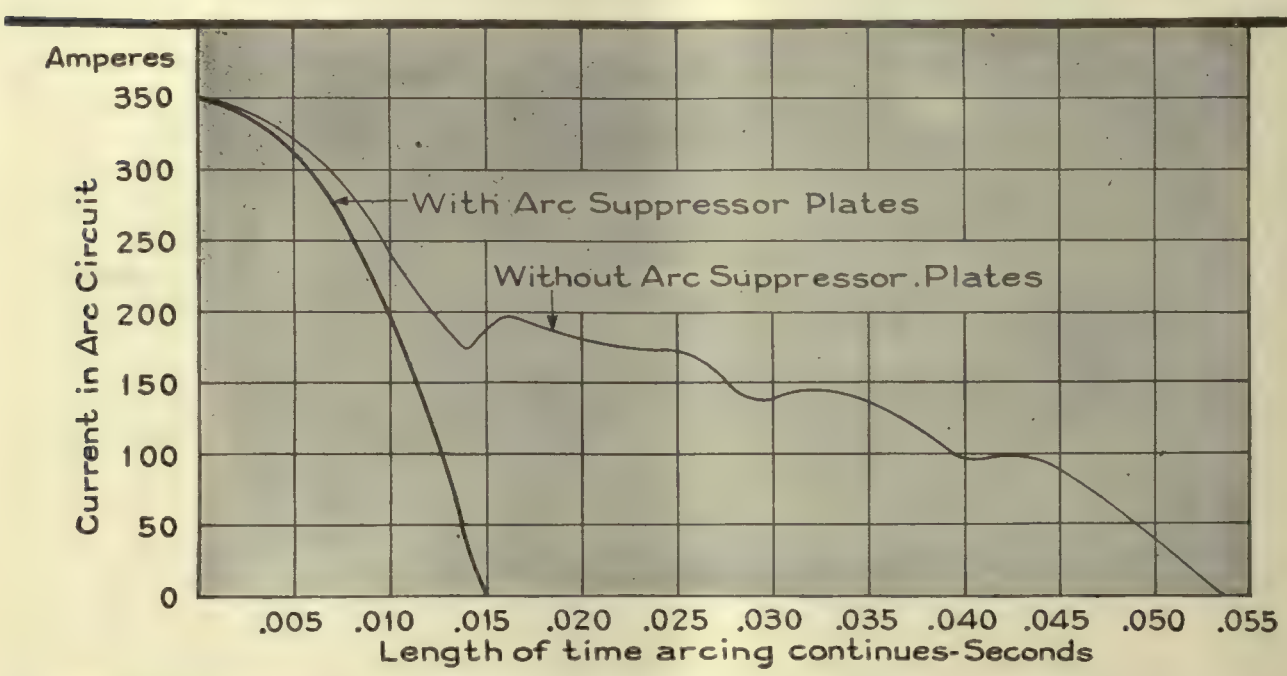
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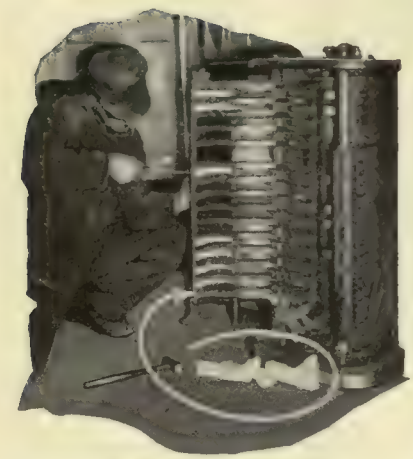
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What G-E Arc Suppressor Plates Do





G-E Arc Suppressor Plates are installed opposite the fingers where there is the most arcing. They narrow the arc passages, which increases the resistance of the arc and the cooling effect of the plates.

NOTE the difference in time required to disrupt the arc in a K-35 controller as shown by actual test. This difference means there's considerably less burning of controller fingers, segments, and arcing plates when the equipment is protected with G-E Arc Suppressors.

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New York, Saturday, June 16, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61
Number 24

Maintenance Cost Reduced by Reclamation of Parts

ACCORDING to J. T. Porter, one of the speakers at the convention of the street and interurban railway section of the Southwestern Public Service Association, all maintenance is reclamation. The distinction usually made is merely in degree, maintenance being applied to the operating units of the property. Mr. Porter has carried the idea to some of the smaller parts that usually are neglected. On his road a department has been organized to repair parts usually kept in stock, and reissue them when they can be used to advantage. By so doing the costs of maintenance have been cut some 20 per cent for the first quarter of the current year, although more work has been handled in the shops than last year. The details of this were published in this paper June 2, page 931.

Many roads have an accumulation of abandoned parts removed in the process of maintenance that in their usual state are of no value. Yet no one in authority wants to see them thrown out, as they may be useful "some day." In other words, the shop yard is like the old-fashioned housekeeper's attic, full of old furniture, bric-à-brac and clothes that are hauled out periodically but seldom used. But Mr. Porter's plan gets the material used, if it is worth reclamation, or sold to the junk man, if it is beyond economical repair.

In this season of the year, when much attention is being paid to clean-up weeks, it will be well for railways to take the matter up and see if a reclamation department may not be established to utilize those parts that are good and get rid of the remainder, thus conserving time and money.

Remodeling Obsolete Cars of Questionable Economy

A NUMBER of companies have been pulling cars virtually out of the junk heap to remodel them for one-man operation. This is an attractive proposition, they say, because the rehabilitation and equipment with some safety devices, air brakes and platform doors, and rearrangement for one-man operation, can be done for about one-third the cost of a new one-man safety car.

If the result were anything like the equivalent of a new car, then it would be a very sensible way to conserve investment while securing additional rolling stock. But unfortunately such is not the case; and it is feared that such investment may be of questionable value, or even a waste. The reason is that it is impossible to get modern riding qualities, acceleration, and economy of maintenance and energy consumption with the motors and trucks and excessive weight of a date ten to twenty years back.

The old motors are slow and heavy. They consume much more energy than modern ventilated motors of about half their weight per horse-power. They require considerably more expense in maintenance and are the cause of more pull-ins, the cost of which in loss of revenue and increase of ill-will is not readily estimable.

The old trucks gallop and nose if it is attempted to operate at speeds in keeping with the times, particularly when the track is uneven. The large wheels make the steps high, and boarding and alighting are correspondingly slow. The body is heavy and it does not give even the appearance of a new car.

Hence, by the remodeling plan, the attraction which the public attaches to new, modern cars is not gained. Nor are the speed and comfort of the service appreciably improved from the public standpoint. And the operating economies possible in new cars from lower energy consumption and less maintenance and the possibility to get more car-miles per car-hour are not realized. In other words, neither the public nor the company gains much by the further investment in obsolete cars. The public is not fooled much by the fresh paint and the platform doors, even though the railway management may be.

If further investment in rolling stock is justified at all, it would seem that this should be put into truly modern cars, not into the process of camouflaging what ought to be burned, not restored.

Inclosed Car Storage Assists in Giving High-Grade Service

THAT the question of how best to store active surface cars is not settled may be seen from the study made by this paper and published in this week's issue. This study was undertaken upon learning that certain companies were giving serious consideration to the construction of carhouses, although they previously had adopted outdoor storage.

Based alone on the comparison of the cost items as far as they can be definitely estimated, open storage frequently appears attractive. The investment is materially less and the insurance rates are lower. That maintenance costs are increased is not denied, but usually it is estimated that the saving in interest and other charges is more than sufficient to offset this.

Possibly some of the designs employed for carhouses have been more elaborate than necessary, and hence more costly. On the other hand, the fire insurance authorities recommend permanent fire walls to divide open storage space into bays containing, say, three tracks each. If this construction is adopted the additional cost of a roof is not very great, nor is the fire hazard materially increased, as sprinklers can be used to give a high degree of protection.

The fundamental problem, however, is not settled so easily. It is necessary to find which method of storage

will result in the ability to earn the greatest net revenue over a period of years. So many indeterminate factors enter into this consideration that it is difficult, if not impossible, to formulate an exact statement, and the answer becomes a matter of opinion.

No one can tell in exact figures the money value of clean windows, for instance, or whether it will be enough to justify the expense of washing them. More serious are the delays that may occur when cars have been improperly inspected and maintained due to the natural slighting of such things when men are forced to work under unfavorable conditions, such as are inevitable with open storage.

The accumulative experience with open storage seems to be tending to swing opinion back more decidedly in favor of closed storage. In fact, if equipment and transportation men were free to select the type of storage, it is probably safe to say that it would require a much greater saving in favor of open storage than can be shown, to overcome their preference for inclosed storage from the maintenance, operating and merchandising standpoints.

Since the function of a street railway is to give service first of all, it is worth careful study to determine just how much should be sacrificed in this direction in reducing the costs that can be tangibly figured.

Systematic Space Allotment and Ample Handling Equipment Will Expedite Shop Work

A LARGE amount of the time and labor consumed in repair shop operations is spent in setting up and handling the material. A study of the various operations will often disclose the fact that substantial savings can be made by a rearrangement of certain machine tools. An efficient shop is arranged so that the operations performed most frequently will require the fewest possible movements and so that the route of the material through the shop will be as short as possible.

Care needs also to be taken to prevent interference between different jobs. Crowded conditions are quite common in electric railway shops, largely because the amount of work handled has increased without additional facilities being provided. These crowded conditions can be remedied somewhat by a systematic allotment of definite spaces for different materials and by arranging so that handling operations are not interfered with. Unnecessary accumulation of scrap uses much valuable space and also gives the appearance of neglect and disorder. Miscellaneous parts scattered over the floor while work is being done on other parts interfere with the work and help to increase the congestion.

Where the same operation is being performed constantly, jigs and special fixtures will save much time. There are very few electric railway shops where frequent operations have been specialized. When the same man is used continuously on one class of work he becomes particularly efficient in its performance, and if he is provided with special tools and fixtures for doing the job his interest is aroused to accomplish larger amounts of work in a given time.

The value of ample handling devices in a shop can hardly be overestimated. Auxiliary jib cranes are not expensive to install and a few additional may save much time due to waiting for crane service. It is also very desirable to reduce trucking operations as much as possible, for these consume many man-hours. Sometimes relatively inexpensive changes in shop layout will enable material and equipment to be handled from one machine to the next by a crane or overhead traveler where otherwise trucking is necessary.

It would be well to study present shop arrangements with the idea of reducing delays and labor. It is one of the best sources of maintenance economy.

Railways Should Use Welding Wire Specifications Drawn by Welding Society

A GREAT deal of the success of electric welding depends upon the material of the metal rods used. Yet, in spite of the advances made in the art as to the requirements for satisfactory welding wire, many users still seem to think that almost any kind of metal will do the job. Satisfactory results are sometimes obtained without giving particular attention to the wire used, but it is generally conceded that most careful consideration must be given to both physical and chemical characteristics in order to secure uniform results.

Among the many desirable characteristics sought in welding metal, two qualities are particularly essential: One of these is that the material should be of such a composition that it will be suitable for the particular work being done. The other is that it should possess the qualities for going into the weld and combining with the parent metal without "bubbling" or "sputtering."

With these facts in mind the welding wire specifications committee of the American Welding Society has spent nearly two years in collecting data and formulating specifications. Chemical analyses of welding wire in general use for both gas and electric welding have been studied carefully. Physical properties have been analyzed and tests specified which include microscopic examination of the metal deposited. Various qualities and service results obtained from the use of the wire have been tabulated and analyzed. As a result of this extended research four specifications for welding wire have been issued by the society.

Electric railways seldom possess experimental staffs adequate for a thorough investigation of such a subject as welding rod specifications, and purchasing agents have little knowledge of the requirements and must necessarily work in the dark unless some such specifications as those of the welding society are followed. Of course each manufacturer has some "talking point" about his welding material, for it must possess some advantage not possessed by competitors in order to sell. The result is a great diversity of welding materials on the market, which merely emphasizes the need to be guided by the recommendations of a competent authority.

The American Welding Society committee gave special consideration to arranging the specifications so that inexperienced users as well as purchasing agents would find them a complete guide to their requirements. Furthermore, the specified materials are now available, for the manufacturers have not been slow in taking advantage of the opportunity to provide welding wire which would meet the specifications of the American Welding Society and thus have this society's approval. Many manufacturers are now advertising wire which will meet these specifications.



An Example of Recent Closed Storage Construction. Callowhill Carhouse, Philadelphia

Inclosed Storage Favored from Standpoint of Service Reliability

Survey of Experience and Opinion Discloses Apparent Swing Back to Protected Storage, Though It Is Difficult to Justify the Investment on Basis of Tangible Savings—This Explains the Use of Open Type in Practically All Recent Construction

FOR several years the tendency with regard to car storage facilities has been to favor the open type, but more recent developments have indicated that a change of opinion may be bringing a reversion toward closed storage as the more practical plan. Accordingly, the ELECTRIC RAILWAY JOURNAL has made a study to determine whether or not this condition really exists. Information was secured on several definite points from a number of representative railways in various parts of the United States. Answers to certain specific questions are given in the accompanying table.

The first question that comes to mind in the comparison of the two methods of storage is the effect on the exterior painting of the cars. The study made indicates that there is a general agreement that the cost of painting is increased due to open storage. One large company in the East states that the cost of painting is increased materially, particularly the maintenance of roofs and all exterior iron work, and that cars should be shopped on shorter periods in order to maintain an appearance equal to that of cars kept in closed storage. Even in the South the general opinion is that car painting cost is increased. On the Pacific coast it is stated that the life of paint is doubled with closed storage. An interesting commentary is that closed storage of trailers which are used only a few hours a day results in notably longer life of the paint.

MAINTENANCE OF AIR EQUIPMENT

Regarding the maintenance of air brakes and air apparatus, there is not quite the same unanimity of opinion. Some of the large systems throughout the country state that the cost of this item is increased materially in open storage, while others in similar territory do not find any increase in such expense. Proper drainage of the air system as soon as the car is turned in from service will prevent much of the trouble due to freezing of the piping and other parts of the air system. One company states that the installation of cooling coils which remove moisture from the air system has reduced freeze-ups to a minimum. Another does not think that there will be any noticeable increase in the cost of this item until the temperature has reached 10 to 15 deg. below zero (F). At that stage, and colder, an increased amount of friction is bound to result by the time enough heat is given off to start lubrication, even with a special low cold test oil. While this is probably a small feature in the maintenance of the individual car it becomes an important item to consider in the aggregate.

There is very general agreement that other items of maintenance are increased in cost by open storage. One company states that this applies particularly to doors, steps and step control and windows. The continued action of the weather on the windows causes warping and swelling, resulting in an excessive amount of broken glass due to sash and doors sticking. Windows and ventilators are likely to be left open during storms, and the weather beating on the interior of the car is bound to cause considerable damage. Maintenance of electrical equipment, life guards and roof canvas is also said to be greater.

In the South there is much more rapid deterioration of the car bodies due to the woodwork developing rotten spots, steel sheathing becoming pitted with rust, and canvas roofs cracking and leaking badly. In the North, cars are occasionally taken out with brakeshoes frozen to the wheels, which causes flats and increases wheel

maintenance. Certain motor failures may be caused by snow blowing in the ventilating covers when the cars are stored outdoors, as there is insufficient heat remaining in the motors to vaporize the water as the snow melts. Chilled and frosted metals such as axles, wheel flanges and journal boxes are subject to breakage. If due allowance is made to provide over-sizes for extreme cold climates, then there is a higher cost for hauling the excess weight. One company reports that there is a great deal of trouble with electric couplers on account of moisture getting in the plugs and freezing. This may be caused by drippings from the car roof, due to melting of snow by the heat in the cars, or from condensation, etc. This frequently is the cause of cars being late for service and the cause of delays after they are in service. High snow and ice in the yards causes much trouble from interference with doors and step mechanisms.

Open Storage Has Some Added Problems of Maintenance

There does not seem to be any general agreement on the question whether it is harder to secure proper maintenance with open storage. One company states that many small jobs which are taken care of by inspectors under covered storage are either patched up or neglected entirely during bad weather, thus causing pull-ins. Another reply is that open storage increases the difficulty of keeping clean cars on the road. Comment on this is: "I have on a number of occasions observed in some of our large storage terminals a complete yardfull of clean cars emerge from a dust and rain storm with the appearance of never having been cleaned, and the work of the car cleaners entirely lost for that day." Another company, on the Atlantic seaboard, states that during very cold weather and when it is snowing or raining, it is naturally more difficult to work on cars in the open than when they are under cover. It is believed that this must to a certain extent increase the maintenance costs, as well as make it difficult to obtain proper inspection and maintenance.

A company in the Middle West states that open storage means extra labor to secure proper maintenance. Cars housed under cover in the winter get a chance to free themselves of mud and snow picked up on the runs, and are in better condition to work on and under after they have stood in the carhouse a while. But by laying out a regular inspection schedule so that the cars due for inspection will be placed under cover that night, the storing of cars outdoors or indoors is not of such great consequence in taking proper care of maintenance.

A superintendent of equipment who has had wide experience in different climates says that even based on adequate room and well-equipped, warm inclosures for inspection work, the cars taken in from open storage probably cannot stand a sufficient time to dry out, or thaw out, and inspection will not be as satisfactory as if cars were stored in warm inclosures during their entire period of rest. Another company reports that precipitation, whether of rain, snow, or even of dew, dripping from a car roof is likely to get on the windows and sides of a car, and the money and effort previously expended in cleaning the outside of the car are entirely thrown away, because the results are destroyed before the public can see it. The same company states that since the introduction of the practice of storing cars in the open the number of men employed on car cleaning work has been very materially increased, yet the standard of cleanliness of the outsides of the cars is far below what it was when all covered storage was used.

Maintenance Standard May Fall in Severe Weather

The indications are that the maintenance standard is likely to fall during stormy weather when open storage is used. In this connection the following statement is typical: "Men do not like to work in open yards during stormy weather, and at such times a large number of men report that they are unable to work on account of sickness." Another company states that while abnormal weather conditions are usually accompanied by excessive equipment failures in any case, it is undoubtedly true that the effect of such conditions is worse on cars in open storage than on cars housed under cover, even though in an unheated building. Another comment was this: "During abnormal weather we have more equipment failures, also accidents, both resulting from less thorough inspection and repairs." The human element is also indicated in this answer: "In this day and age, unless men are working under the most favorable conditions, which in bad weather means that cars must stand for several hours before they can dry out or thaw out, it is inevitable that some of the work will be slighted, and car failures usually are the result of the lack of good inspection."

While with open storage there is some additional cost for car heating if the cars are to be sent out on the road in comfortable condition, this is offset largely by additional heat required in the carhouses for a longer period. The extra cost of car heating depends to some extent on the type of heater used. With hot water or hot air, the time required to get a car warmed up is considerably longer than with electric heat. But with any type of heater, cars frequently are put in service while still cold. One observation is that this does not affect the earning power of the car, although it is safe to say that it will not tend to engender kindly feelings on the part of passengers toward the company.

Open Storage May Lower Fire Risk

The fire hazard is an item of considerable moment in the comparison of the two kinds of storage. Several serious fires in the past year have occurred in carhouses. Open storage permits the use of water towers, giving fire control over a large area. On the other hand, a building construction for inclosed storage can be provided which is entirely fireproof. In that case the installation of automatic fire sprinklers reduces the hazard materially. In fact, some companies believe that the installation of sprinklers in a fireproof carhouse makes the protection greater than for open storage with fire towers but without sprinklers. The insurance rates, however, indicate that the insurance authorities believe the hazard is substantially less with open storage.

There does not appear to be a general agreement on the financial results to be obtained by the substitution of open for inclosed storage of cars. An increase in the total cost of maintenance is admitted in practically all cases, but the saving due to open storage may or may not equal this, so that it is doubtful whether one or the other is cheaper, when considered as a general proposition. The answer seems to depend on the individual road, and the methods employed for inspection and repair work.

One reply states: "For cars that are in regular

REPLIES OF NINETEEN COMPANIES TO SPECIFIC QUESTIONS

Company	Is the Cost of Painting Increased by Open Storage?	Is the Cost of Maintaining Air Equipment Increased?	Are Other Maintenance Costs Increased?	Is It Harder to Secure Proper Maintenance with Open Storage?	If So, Are Abnormal Weather Conditions Accompanied by Excessive Equipment Failures?	Is the Cost of Car Heating Increased?	Does the Saving in Interest Charges More than Offset Any Added Costs of Open Storage?
New England							
1	Not materially	No	Slightly	Very little	No	Short period	Largely
2	Yes	Yes	Yes	Yes	Yes	Yes	No
Eastern							
3	Considerably	No	Greatly	Yes	Yes	Not materially	Probably not
4	Yes	Yes	Yes	Yes	....	Yes	Questionable
5	....	....	Yes	....	....	Yes	Yes
6	Yes	Depends on location	Yes	Yes	Yes	Yes	Depends on construction
7	Yes	Yes	Yes	Yes	Yes	Yes	No
Southeastern							
8	Greatly	Some	Yes	Yes	Yes	Slightly	No
9	Yes	Not if drained	Bodies	No	Yes	Not materially	Questionable
10	Greatly	....	Much	....	....	....	Depends on climate
11	Yes	Yes	Yes	Yes	Yes	Yes	Cannot say
Middle Western							
12	Yes	No	Yes	No	No	Yes	Yes
13	Yes	No	Yes	No	No	Not locally	....
14	Yes	Cannot say	Not much	Yes	No	No	Yes
15	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17	Yes	Yes, at 10 deg, F	Yes	Yes	Yes	Yes	Questionable
Pacific Coast							
18	Yes	Yes	Yes	No	No	No	Yes
19	Double	....	....	Yes	Yes	....	....

service eighteen hours a day or in tripper service for several hours each day, closed storage, in my opinion, is not warranted. For every car so stored there is an expenditure of from $2,000 to $4,000 required, and the savings effected will not warrant such an expenditure. Most of the failures where open storage is used are due to the methods of handling the situation rather than to the open storage."

Closed Storage Preferred by Operating Men

A company in the Middle West states: "We have several outside storage yards. To equip these yards with facilities for inside storage would cost a large sum of money. This question has been gone into, and we are thoroughly satisfied that for a town located as we are as to climatic conditions, inside storage would not be justified. While there is additional expense with open storage the saving on these items would not justify the interest charges for the necessary buildings for inside storage."

Another reply gives the matter a different aspect. "The correct answer to this question is a matter of careful study. I believe that when the cost of the delays and unsatisfactory service rendered by open-storage cars is added to the cost of other increased maintenance, it will be found that the sum is in excess of the interest charges on suitable covered storage." One significant statement from a company operating in New York State is: "We are at present considering covering all our open storage yards."

A company on the Atlantic seaboard writes: "This is a difficult question to answer from our limited experience with open storage, but we believe the increased cost of maintenance in open storage will be greater than the interest charges of capital investments for carhouse buildings."

Another company in the Atlantic region states: "It probably would be more economical to use open storage, but very much harder to keep the cars looking in good condition; and in my opinion this is one of the most important points in city operation. There is no question but that the well-painted, clean, quietly-operating car tends to attract passengers, particularly those who desire to ride a short distance; and the additional cost of keeping this equipment, particularly the paint, in good condition should be considered very strongly and weighed against the saving that might be made due to the use of open storage." This is from a company notable for its success in building up a short-haul business.

The same thought is given in a different way in the following: "Our calculations have always indicated that the saving in interest charges more than offsets any added costs of open storage, although my personal opinion is that we cannot get a true measure of all the factors. In the capacity of superintendent of equipment I would like to see all cars housed every night just the same as we house all of our automobile equipment; but we must concur in what is shown by figures to be the most economical thing to do. With storing cars out in the open yard, we of course have difficulty on winter mornings in getting cars out on time. Unless the tracks are salted carefully the cars will freeze in, or the brakeshoes will freeze to the wheels. The roofs are covered with snow and the cars do not look as well as though they had been in the house all night; but after they have been on the street for a few hours on a stormy day it is hard to tell which was inside or outside the night before."

A superintendent of equipment who has had wide experience in various sections of the country sums the matter up as follows: "I feel that in all Southern climates, up as far as Washington and perhaps Ohio, open storage is the most economical in the end, and logical, but in all cases the inclosed place for inspection work should be ample and well equipped so that the work can be carried on with comfort. All carhouses should be double end, that is, arranged so that the cars will come in one end of the carhouse and out the other. This is also particularly important with open storage. In the extreme eastern and northwestern sections of the country I have always felt that while open storage may prove economical, there is such a demand nowadays for high-class, uninterrupted service that the railways should provide themselves with 100 per cent inclosed storage. In a number of cases in the past I believe more money has been put into the buildings than was absolutely necessary for a street car house."

Some Comparative Costs

It is difficult to obtain concrete figures for comparison of the costs of maintenance in the two cases. According to one company that has used both kinds of storage for several years, the average cost per 100 ton-

miles for shifting, car cleaning and similar items was 4.7 cents for a covered storage house, while similar costs for an open storage yard handling approximately the same total ton-miles was 6.9 cents per 100 ton-miles. These figures cover a period of two years. Thus these costs are increased 47 per cent with open storage. The cost of repairmen for the same locations are 6.5 cents per 100 ton-miles for the inclosed storage and 8.6 cents per 100 ton-miles for the open storage, or 32 per cent more.

It is stated that the effect of open storage on operation is a serious matter, the cost of which is difficult to determine. It affects the proper maintenance of schedules and the delays attributable to storage conditions come at the very times that the failures due to severe operating conditions are most numerous, thus pyramiding the trouble. For instance, in a sleet storm there is no way to keep the wires in the storage yards clear of sleet, and in order to move the cars it is necessary for men to get on the tops of the cars and pound the wires with clubs.

One company figures that a fireproof cover for a 50-ft. car will cost, at present prices, about $700. Taking interest, taxes, depreciation and maintenance at 15 per cent gives an annual carrying charge of $105 per car. Against this must be set the saving in car cleaning expense and car maintenance expense, amounting to $150 per car per annum. It is also estimated that there is an additional value for the car stored under cover on account of better operation amounting to $50 per annum. Thus in this particular case the annual net value per car due to the inclosed storage is $95, over and above the charges on the structure.

This may be an extreme case, as the location is where the winters are comparatively severe, although there is little weather with temperatures much below zero.

In general, it would appear that while open storage is cheaper and may give lower rates for insurance, the increased cost of maintenance will largely offset this, and there is a distinct advantage in having the cars stored under cover so that work can be done on them under the most favorable conditions. Whether the monetary value of having cars in better condition for early morning service in the winter months is sufficient to throw the scale one way or the other depends largely on the climate, as indicated in one of the answers.

Remodeling Obsolete Cars for One-Man Operation

The Lehigh Valley Transit Company Has Converted Several Types of Obsolete Single-Truck Cars for One-Man Operation—Several New Features Have Been Worked Out in Connection with the Control and Fare Collection Systems

THE rehabilitation program of the Lehigh Valley Transit Company, Allentown, Pa., includes the reconstruction and remodeling of a considerable number of the company's old-type cars which are now considered obsolete. The single-truck cars are being converted for one-man operation. Up to April 1, 1923, fifteen cars had been completed and additional cars will be changed over as rapidly as conditions will permit. The cars which have been changed over were originally of three types. Some of these were open cars, some were center entrance and others the usual form of single-truck closed car. The accompanying illustrations show the varying types of construction which were necessary in remodeling the different types. In general, the design and equipment after they are converted for one-man operation are similar, and a description of the conversion of the 400 type will serve as a good example of the work accomplished.

The 400 type cars were originally arranged for center entrance and were purchased in 1908, and served their purpose until they were placed in the storage yard as obsolete. In order to return these cars to service a complete overhauling would have been necessary, and the officials felt that in attempting this they could be changed to one-man operation at a figure of approximately one-fourth the price of the present standard safety car and that under these conditions the expenditure was warranted.

Changes in Car Body Construction Found Necessary

The center-entrance doors and steps were removed and the side panel made continuous. Two windows were added in the place originally occupied by the door.



Single-Truck Center-Entrance Car Before Remodeling

The original bulkhead sliding doors were removed and an open header construction was substituted. By this construction the original strength of the car was retained and at the same time the objectionable sliding doors were eliminated. Two additional side sills were placed under the car body to give greater strength and rigidity, as the original design was weak in this respect and the cars were found to be sagging at both ends. The original folding doors on the front right and rear left sides of the platform were rearranged so as to permit operation by pneumatic door engines. A beveled dash was installed on the exterior over the bumper. This adds considerably to the appearance of the car and also serves to prevent small boys from stealing rides on the rear end of cars.

The seats originally were fitted with a carpet covering. This was removed from the backs and cushions, and after remodeling and considerable scrubbing these were

finished in cherry and varnished to give a sanitary construction. Originally the headlining was finished in robin's egg blue. Continued service had turned this to a green. This was refinished in a buff color, which is standard with the company. The leather hand straps were replaced with a sanitary celluloid type furnished by the Railway Improvement Company.

Six stanchions were installed in each platform. Two of these are arranged one each side of the door for the convenience of passengers entering and leaving the car. These also serve as supports for the National Pneumatic door engines, which are installed in a closed compartment over the door entrance. The stanchions also contain the air pipes leading to the door engines and the control rod for operating the door. Two stanchions are placed back of the motorman and serve to support the motorman's seat. One is installed at the motorman's right for supporting the fare box and one is placed at the right of the bulkhead opening to serve as a grip for the passengers who are standing.

The position of the door engines is convenient for inspection and is also so located that there is little danger from freezing during the winter months. The folding step is connected with the main door shaft and operates in synchronism with the door. Two of the panels in each door were fitted with plate glass so as to give the operator a view of the step and also give a view of small children outside the car when the doors are closed. The doors are controlled through a small shaft which extends vertically in front and to the right of the operator. This shaft is provided with a small handle at the top for hand operation and a small lever at the bottom for foot operation. A slight movement of this shaft controls the opening and closing of the door, and no particular care is required in this movement. The engines are equipped with pneumatic cushions to prevent slamming of the doors in either direction.

The original monitor decks of the cars which were fitted with Cathedral glass ventilators have been retained in their original condition, as it was felt that this type of construction was quite satisfactory. The vestibule is arranged with three front observation windows. The left-hand side, which originally contained folding doors, was paneled solid and a comfortable operator's folding seat was installed. Platform equipment was relocated so as to provide for the installation of the air-brake valve, register operating button, fare box, air sanders, hand brake, etc. The piping at the front end is surrounded with a wooden housing. The top of this serves as a sort of desk for the operator, and he uses this for his transfers and other necessary equipment. The original type Brill 21-E trucks have been retained.







Three Types of Cars After Remodeling for One-Man Operation
The car at the left was originally a two-man closed car. The car at the right originally was of center-entrance type, and the one at the bottom an open car.

New Equipment Installed

The original electrical operating equipment was maintained on the car and in addition a General Electric Company's line switch was installed. This removes the making and breaking of the control circuit from the platform controller and prevents carbonizing and short-circuiting troubles. Its use also provides a convenient method for interlocking the operation of the doors and steps with the control equipment.

A complete straight air-brake equipment was installed consisting of a General Electric Company's CP-27 compressor, a G.E. type S form L1 brake valve, type ML form A1 governor and 8-in. x 10-in. brake cylinders. The original brake rigging was retained and the air brakes were connected into this system. The hand-brake equipment consists of a Horne double-acting hand brake which is located at the left-hand side of the operator's seat, in a convenient location so that it can be readily reached at all times.

Since these cars are arranged for double-end operation, special provision is made for cutting off the air supply and locking the various parts of the equipment on the non-operating end. This is accomplished through a locking shaft which is operated by a handle. When

the operator goes to the other end of the car he takes this handle with him. A 90-deg. turn of the locking shaft closes two air cocks. One of these is for the supply of air for that end of the car and the other for the brake pipe which holds the air in the brake cylinder until released. In addition to these two air cut-outs two mechanical locks are located on the locking shaft underneath the vestibule platform. One of these locks the folding step and pneumatic door and the other locks the main rod of the rear wheel guards. This prevents the rear wheel guard from dropping and dragging along the pavement.

Platform Apparatus Is Locked on Rear End

By means of this locking shaft all apparatus is locked and released at one time and thus it is impossible for the operator to forget some individual parts. Over the top of the motorman's brake valve are two levers which form a part of the Ohio Brass Company's sander equipment. One of these operates the air sander and the other controls a pneumatic gong. These levers are also locked through the movement of the locking shaft.

The fare-box stanchion is located in the center of the platform convenient for both passengers and operator and supports a Johnson fare box which records dimes, nickels and pennies. The totalizer, reading in dollars and cents, affords a double check in conjunction with the register. The stanchion for supporting the fare box is constructed of 1-in. pipe at the top and bottom. The section immediately behind the fare box is made of 1½-in. pipe and contains a 110-volt lamp of the tube type.

This lamp is approximately 6 in. long and is 1 in. in diameter. Five ⅛-in. holes are drilled in the stanchion to permit light from this lamp to shine into the examination compartment of the fare box. This affords light for the operator to view the coins deposited at night without having the glare of the light on the front windows of the car. The fare box lamp is connected in the same circuit with the headlight and changes from end to end when the headlight switch is thrown. Located on this same stanchion above the fare box is an extended mirror. This can be placed in either a vertical or a horizontal position as desired by the operator so that he can view the main portion of the car body to see that passengers are seated before starting the car and also to see passengers as they approach for exit.

Electro-Pneumatic Fare Register Used

A register of the International R-5 type records cash and transfers and has been rearranged to operate by electro-magnets. The current for these magnets is controlled by a pneumatic switch located in the vestibule convenient to the operator. By using the combined air and electric device a positive contact is insured for the electric circuit, and the locking feature, as already described, is more conveniently taken care of. The turning of the locking shaft, as previously referred to, prevents the register from operating when that end of the car is locked. In regular operation the operator presses buttons marked "Cash" and "Transfers," but when in the locked position these buttons can be pressed, but there will be no response by the register.

Another feature of the equipment is the use of an Electric Service Supply Company's pneumatically operated gong. The operation of this gong is controlled by one of the fingers of the Electric Service Supply Company's double-valve, gong and sanding attachment located over the brake valve. This method of operation is of great convenience to the operator and relieves him from the continual pounding of the pedal.

The lighting of the car has been rearranged and the original cluster design of fixture has been replaced by Electric Service Supply Company's fixtures with shades extending in one line down the center of the car. These cars are provided with electric signals and tail lights. These are of a design made by the Lehigh Valley Transit Company and are arranged to give a red, green, white or dark signal on either end, or on both at the same time, as desired. A description of this lighting fixture, together with the diagram of the connections, will be published in a subsequent article. Under normal



Arrangement of Platform on One of the Remodeled Cars

conditions these lights are operated from the main lighting circuit of the car, but in order to provide for keeping them lighted in case the trolley pole should leave the wire, a storage battery is also used. This is of the Ohio Brass Company's type and a line relay regulates the turning on and off of the storage-battery circuit whenever power from the trolley wire is interrupted.

A passenger signal system has also been installed as a part of the equipment, with push buttons between each pair of windows and additional buttons at the bulkhead for convenience of passengers as they leave the car. Electric Service Supply Company's high-voltage buzzers are used, the current being supplied direct from the trolley circuit. The cars are equipped with electric heaters, which are controlled by thermostats and have automatic regulators. The thermostats are set so as to keep the temperature of the car between 65 and 70 deg.

The original equipment of HB wheelguards were retained on these cars with the exception of the location of the operator's tripping and resetting pins. The cars are equipped with two trolley poles in place of one used originally, and Ohio Brass Company's trolley retrievers are used. The use of two poles for the car relieves the operator of the inconvenience of turning a pole around when changing operating ends.

In order to accelerate passenger movement and to relieve the operator of additional trouble in fare collection, a large sign is located on the right front end of the car reading "Front Entrance—Have Exact Fare Ready."

Carrying Safety to the Public—VI*

Newspaper Publicity Has Proved a Most Effective Method of Making the Public Realize the Personal Feature of the Safety Campaign—Signed Articles by Prominent Persons, News Items and Cartoons Used Advantageously

By C. W. Price
Vice-President in Charge of Public Safety
Elliott Service Company, New York City

IN ANY organized community effort to promote safety the newspapers constitute one of the three most direct and effective mediums through which to carry the safety message into the homes every day in the year.

Because of the alarming increase of accidents and the aroused public interest, the newspapers in most communities, if properly approached, are willing and glad to sponsor the campaign to promote public safety, just as they sponsor similar campaigns to combat other evils that menace the life of the community.

In order to secure the intelligent and whole-hearted co-operation of the newspapers it first is necessary thoroughly to acquaint their editors with the plan and purpose of the campaign, and to outline with them a definite program of publicity.

Much of the material must be prepared for the press. It goes without saying that items regarding the campaign which have direct news value are the ones most sought after by the papers, and will be given a prominent place each day.

Often a newspaper will assign one reporter to handle all news items on safety. This reporter soon becomes familiar with the various phases of the work and the point of view of those who are promoting the campaign. Thus he can add much to the effectiveness of the publicity.

In the initial stages of developing an organization, it has been found advisable to release to the press a complete story on each feature of the program when it has developed to the point where it can be announced. For instance, when the school authorities have agreed to introduce safety instruction into the schools, a col-

*One of a series of ten articles.



(*Cassel in New York Evening World*)

Safety Week!



Safety First—This Is Watch-Your-Step Week

(*Powers in New York Evening Journal*)



Pals (Detroit Free Press)

umn article should be released announcing this fact. The method of instruction can be outlined in detail, and the far-reaching effect of this instruction in carrying the safety message into the home can be emphasized.

Thus there gradually will be built up in the minds of the more intelligent citizens a comprehensive idea of the scope of the campaign and confidence in its success.

After the campaign is under way, it is advisable to arrange for a series of articles, each of which should present an adequate picture of some important feature of the campaign. These articles should be signed by prominent citizens whose positions render their views authoritative. For instance, in Washington the articles were prepared by the District commissioners, the commissioner of police, the superintendent of schools, the chairman of the women's committee of the Washington safety council, the chairman of the committee representing the federal departments, and others. Each of these writers discussed the safety campaign from a different viewpoint, and urged co-operation.

"Two-Minute Safety Talks to Mothers," signed by the chief of police, and printed in a box each day on the front page of leading newspapers, have proved most popular and effective. Each talk should cover some one hazard to children in the home or on the street. Pictures of children doing hazardous things on the street are good for the illustrated page or Sunday supplement.

If the newspaper cartoonists become interested in the campaign they can exert a powerful influence in ridiculing the people regarding their careless and reckless habits. Under some catchy title such as "Spark Plugs," pointed hints for drivers can be seen, such as these:

Fools used to blow out the gas, now they step on it.

Drive carefully, you may meet a fool.

Drive as if your boss were sitting in the back seat.

Fools rush in where wise men use the brake.

Each month an analysis by causes of the accident experience of the previous month should be published, with editorial comment covering some of the more flagrant cases of violation of safety rules.

At frequent intervals the newspapers should carry articles instructive in character, covering such topics as safety in the home, rules of the road, safety of children and industrial safety. The editors can do much to establish the campaign in the confidence of the people if occasionally, say once a month, they will give recognition in the editorial columns to its importance.

Stories of accidents which occur from day to day, if properly handled, can be made to play an important part in arousing the people to a realization of the seriousness of the situation and the necessity of taking action.

Two-Minute Safety Talk to Mothers

Did you ever think of this?

What is the use of teaching your baby to walk and to talk and then teaching him to read and write and figure, and then training him to be clean, and moral, and industrious; I say what's the use if after all this effort you have not taught him the perfectly simple lesson of keeping from being killed.

The first duty of a mother is to train her child to protect his life and limb.

FORREST BRADEN,
Chief of Police.

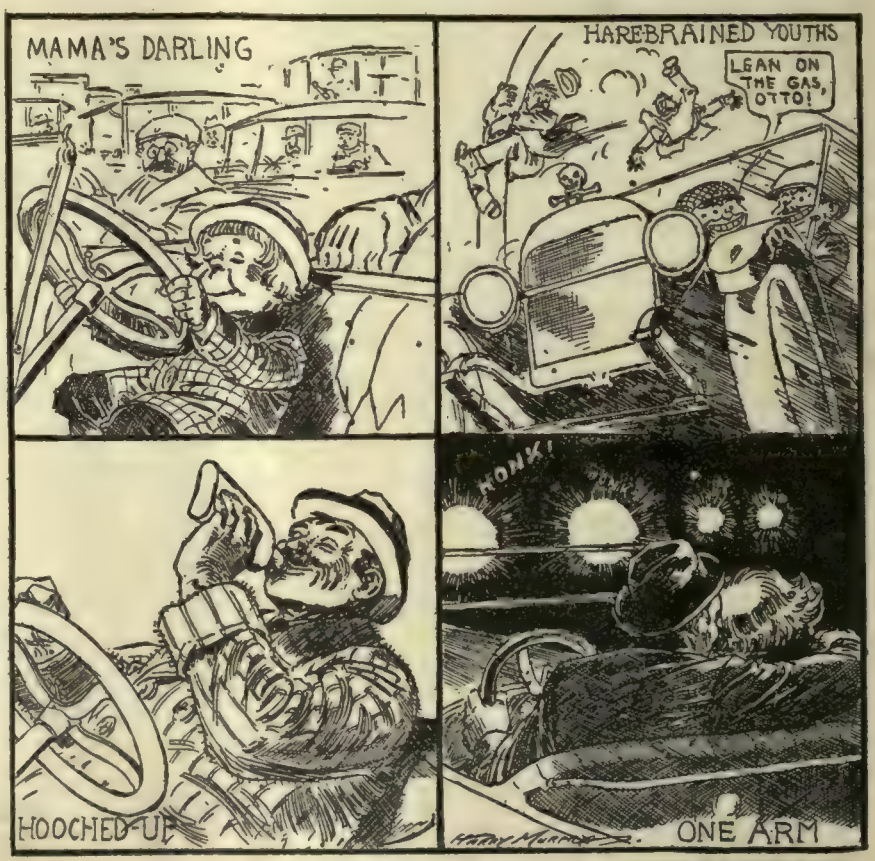
Two-Minute Safety Talk to Mothers

A mother who allows her children to play in a street where there are street cars and automobiles is exposing them to great danger. She might almost as well let them play with fire arms.

Why is it so dangerous for children to play in the streets? Because a child at play is utterly unconscious of everything except the game he is playing and will not look out for danger.

If you allow your children to play in the streets you are morally responsible if they are killed or injured.

CHARLES D. GAITHER,
Commissioner of Police.



Drivers We Can Spare (Murphy in Louisville Herald)

Revarnishing Preserves Body Paint for Six Years

How Careful Application of Initial Coat and Proper Maintenance on Laurel Line Eliminate Need of Frequent Painting in Spite of Unfavorable Conditions

THE frequency with which it is necessary to repaint cars and keep them looking well is a matter that has received much attention in these days of high costs. In this connection, the achievement of the Lackawanna & Wyoming Valley Railroad (Laurel Line), where the period between two successive paintings of the same car has been prolonged to approximately six years, is of particular interest. And this has been done under circumstances which are in many ways unfavorable.

This line operates between Wilkes-Barre, Pa., and Scranton, Pa., through the anthracite mining country along the Susquehanna River, with a branch line running to Dunmore. Private right-of-way exists for the entire length of the line and power is furnished from a third rail except for a short distance in the city of Wilkes-Barre, where an overhead trolley is used. The third rail is uncovered and on that account the friction of the collecting shoe against the steel rail causes steel oxide dust to be deposited on the lower part of the car body, giving it a very drab appearance. This discoloration is similar to that described in the ELECTRIC RAILWAY JOURNAL for March 31, 1923, in connection with the New York, Westchester & Boston Railway, resulting there from the use of steel trolley wire.

Another feature of the situation which makes it difficult to preserve the attractive appearance of the cars is the presence of mine gas in the air. The continual use of explosives in the mines creates large quantities of sulphurous and nitrous fumes, which have an extremely corrosive effect and soon destroy the luster of the car exterior.

But in spite of these unfavorable conditions, the Laurel Line has fresh, clean-looking cars, Pennsylvania Railroad maroon in color. The equipment is repainted only once in six years. Each car, however, has a very thorough varnishing once every two years. This work is carried on in the company shops at Scranton under the supervision of C. D. Shellabarger, master mechanic. Because it is desired to have all available rolling stock in service on the road during the summer months, painting is done between Nov. 1 and May 30 only. From June to November, therefore, the painters are occupied with outside work along the line, painting stations, bridges, etc.

The program followed in the regular revarnishing which each car receives every second year is as follows: The car is thorougly washed with soap and caustic soda. Then the surface is sandpapered, holes puttied up, and glazing done with Valentine's knifing surfacer where it is needed. All glazed areas are next sandpapered, puttied, and retouched with flat color. A coat of color varnish, HL gloss, is applied. The stripes and letters are then touched up, and finally a coat of Valentine's heavy body finishing varnish is applied.

Once every six years, however, a car is entirely repainted. All the old paint on the outside is burned off down to the wood, which is then closely sandpapered. Next a coat of Du Pont No. 1 surfacer is applied. Holes are puttied up and glazing is done where necessary. The surface is again closely sandpapered, after which comes a coat of Du Pont No. 2 surfacer. A repetition of this operation follows, the surface being reputtied, resandpapered, and another coat of the surfacer applied. It is then sandpapered once more, and dusted off, and painted with Du Pont No. 3 body color. The striping and lettering are done next, and afterward one coat of Valspar outside rubbing varnish is applied. The process ends with a coat of Valspar outside heavy body finish.

The interior of the car is stripped bare of everything which can be removed. Only the fare register rod and its brackets are allowed to remain. All surfaces are thoroughly sandpapered, dusted off and touched up with shellac. A coat of Valspar interior car varnish



Paint Still in Good Condition After Six Years

is then applied and the floor is given a coat of Valspar floor paint.

Doors and sash are removed before the painting job begins. Both sides of the sash are sandpapered and touched up with Du Pont No. 1 surfacer. They are then given a coat of Valspar interior finishing varnish and a coat of Kay & Ess sash color. After this comes a coat of rubbing varnish, and lastly the heavy body finishing varnish. For the doors the same process is followed with some slight additional putty and glazing work, if that is needed.

The vestibule is thorougly sandpapered, and touched up with Du Pont No. 2 surfacer. Next is applied a coat of Valspar color varnish, and finally a coat of one-half rubbing and one-half heavy body finishing varnish. After the roof has been scraped it receives an application of Sherwin-Williams deck paint. The trucks are cleaned and then painted with Valspar iron preserver.

The frequency of revarnishing and repainting depends entirely upon the appearance of the individual car. No attempt is made to place it on either a time or mileage basis. Under average conditions, however, each car is varnished about once in two years and painted once in six years. Considerable economy is effected by lengthening the painting period in this way. for the revarnishing costs only about one-third as much as a repainting job. Moreover, a car can be revarnished in five and one-half days, whereas it takes nine or ten for repainting. This is an important item on a road of moderate size which desires to keep ready for service as many cars as possible.

The Havana Electric Railway formerly indicated the different routes on its cars by colors and the destination signs were painted with these colors and the same color combination was carried in the head end of the monitor deck. The increase in the number of routes, however, made the changes necessary, as all the practicable color combinations have been exhausted. Now the divisions are indicated by a letter, and a figure shows the destination. This numbering permits the separation of the system into as many divisions as are convenient, up to twenty-six, and allows the use of nine lines per division. These route signs are illuminated at night.

It Pays to Treat Wood Poles and Ties

Experience of Chicago, Lake Shore & South Bend Railway During Fifteen Years Shows Treatment Insures Life of Thirty Years Under Local Conditions

BY HOWARD H. GEORGE*
Engineer Maintenance of Way Public Service Railway, Newark, N. J.

IN VIEW of the recent activities of the American Electric Railway Engineering Association in the field of wood preservation and of the efforts of the special committee on wood preservation this year to recommend definite specifications for treatment of wood poles, it will probably be of interest to a great many to know of the experience of one electric railway with pressure-treated poles. The data and views accompanying this description were collected by W. A. Underwood, electrical engineer of the Chicago, Lake Shore & South Bend Railway, and were furnished the writer through the courtesy of P. R. Hicks, secretary-manager of the service bureau of the American Wood Preservers' Association. They relate to treated pole installations on the line of the Chicago, Lake Shore & South Bend Railway.

The poles were of Southern yellow pine, about 40 per cent loblolly; they were 45 ft. long, and measured at least 29½ in. in circumference at the top and at least 39½ in. 6 ft. from the butt. The treatment was by the full-cell pressure process, with 12 lb. absorption per cubic foot. They were treated at Pascagoula, Miss., and Slidell, La.

A total of 2,500 poles were set with an average spacing of thirty-two poles per mile. They were installed between Kensington (Chicago), Ill., and South Bend, Ind., a distance of about 75 miles. The line runs through a slightly rolling country. In the section between New Carlisle and South Bend the soil is sandy clay and black loam. Between Kensington and Hammond the soil is black mud, and between Hammond and New Carlisle it is sand.

POLES IN GOOD CONDITION AFTER FIFTEEN YEARS

The poles were set in 1907 and carry an average equipment of two 10-ft. crossarms supporting single-phase and three-phase 33,000-volt circuits, telephone and signal lines, as well as mastarm trolley, etc. The poles were all set in concrete because of ground conditions.

The last official inspection was in November, 1922. At that time sixty poles had been removed, mostly due to the presence of woodpecker holes and consequent decay. A few had been burned by transmission lines, arresters being defective. At that time, the inspection report stated that there were a few more poles that should be renewed, but that the line generally was in fine condition and should easily give fifteen years more service.

Of the poles, 1,290 (about 40 per cent loblolly) were treated at Slidell, La., in the following manner: The poles were first steamed six hours at 30 lb., 274 deg. F. They were next subjected to a vacuum for four hours at 26 in. Oil pressure was then applied for one-half to one hour at 60 to 90 lb. English coal-tar creosote was used, and showed the following analysis:

DISTILLATION	
Temperature, Deg. C.	Per Cent
0 to 170	1.00
170 to 205	5.00
205 to 210	4.50
210 to 235	38.50
235 to 300	26.00
Above 300, residue	24.50
Loss	.50
	100.00
Specific gravity at 38 deg. C.	1.04
Tar acids, per cent	8

The oil used for treating 1,500 poles at Pascagoula, Miss., showed the following analysis:

DISTILLATION	
Temperature, Deg. C.	Per Cent
0 to 210	1.50
210 to 235	42.50
235 to 270	24.50
270 to 318	11.50
Above 318, residue	20.00
	100.00
Specific gravity at 35 deg. C.	1.047

These poles were treated without any preliminary seasoning, that is, some of them had been cut two weeks and some two months. The majority were cut from longleaf yellow pine or second-growth longleaf pine, although about 40 per cent were loblolly. They were steamed twelve hours at 35 lb., followed by a vacuum period of six hours at 23 to 24 in. It required from two to four hours at 100 to 125 lb. pressure to impregnate with 12 lb. oil per cubic foot.

The accompanying illustrations show the pole and track construction used and also the type of overhead. One view also shows the condition of creosoted ties, which were installed about the same time.

This installation of treated poles is extensive, and is a striking example of what can be expected from treat-

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These Poles and Ties Treated with Wood Preservative Have Given Good Service
At left, part of 2,500 creosoted poles set in 1907. In center, track on C., L. S. & S. B. Ry. with creosoted tiees fifteen years old. At right, fifteen-year-old pole which is good for another fifteen years

ment of wood poles. When, after fifteen years of service, only sixty poles, or 2.4 per cent, have been removed from all causes out of a total of 2,500 originally installed, and the remainder of the line gives every evidence of another fifteen years of service, this is conclusive evidence of the ultimate economy of using treated poles.

In connection with the claim made that the principal cause of removal was decay, starting from holes made by woodpeckers, it is of interest to quote from a letter written by Roger F. Hosford of the American Telephone & Telegraph Company. Discussing this claim, Mr. Hosford writes:

The first time I saw any woodpecker attack on a creosoted pine pole was in 1910, when, in a party with Howard Weiss and several others, I looked at several poles near Flanders, N. Y., while we were making an inspection of the Poughkeepsie-Newton Square line. In this case a woodpecker had started to enlarge an unused bolthole but had not gone very far. I think that, if we totaled up our whole experience, we would find many more cases of attack of this kind than of any serious damage. As you probably know, there are several species of woodpecker whose habit is to make their homes in pieces of available timber, such as poles, posts, etc. When a woodpecker has hollowed out a nest for itself in the upper part of a pole it has probably cut away enough of the wood to represent a substantial impairment of strength at that particular section. We have not, however, found many woodpecker nests in creosoted pine poles. I saw one last month in a pole near Fredericksburg, Va., but in this case the top of the original piece had been cut off and decay had run down to about the point where the woodpecker had entered and cut out its nest. The pole must have been more than twenty years old when this happened.

The fairly considerable number of cases where a woodpecker starts at a bolthole or some similar point and cuts away a litt'e wood, as compared with the relatively few cases where it goes so far as to make a nest inside the pole, lead me to believe that whatever woodpecker attack we encounter in creosoted pine holes is due to the woodpecker seeking a nest. For example, a bird notices a bolthole and, needing a home, thinks it can get one by enlarging the opening. In most cases the bird soon gives up the attempt and searches for an easier piece of wood to build a home in. If treatment is thin at the point where the woodpecker starts working, the result might be an opening for decay. Usually, however, the point of attack seems to have been one where there would be no basis for expecting irregularity of treatment, so that nothing important results from the woodpecker's activities.

I have seen occasional articles appearing in periodicals, where reference is made to serious trouble from woodpeckers attacking creosoted poles. I do not know whether the people who report these experiences make the distinction which I do between a woodpecker hole and woodpecker nest, which is very substantial from the structural strength viewpoint, or whether the regions in which the experience has been reported are comparatively devoid of timber suitable for nests so that the woodpecker has to do considerable damage to the pole if it is going to have a nest at all.

Keeping 95 per Cent of the Cars in Service

Complete and Convenient Records Speed Up Inspections and Repairs —The Maintenance Practices of a Small Company Which Keep the Number of Cars Out of Service to a Very Small Percentage

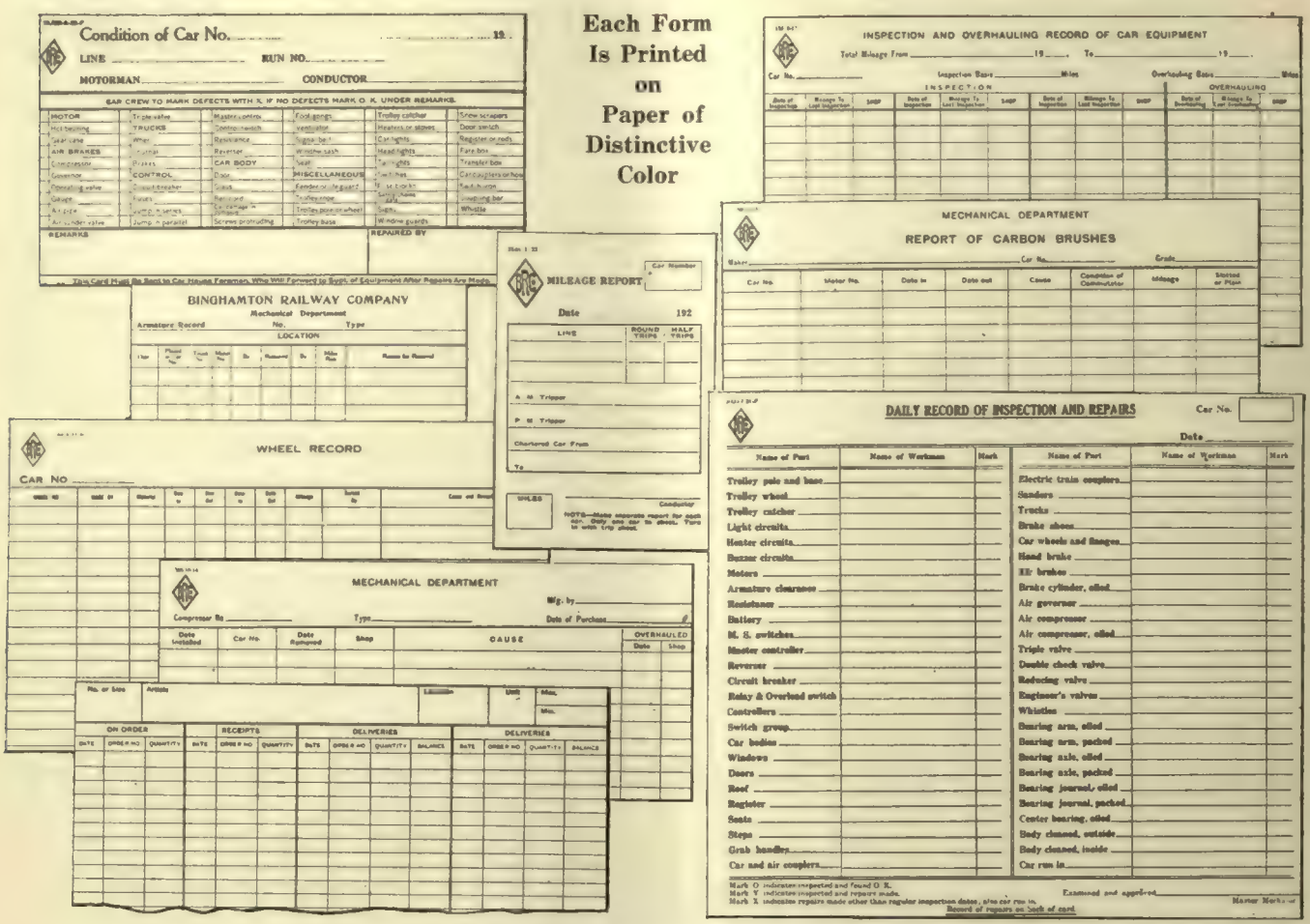
THE weekday schedule of the Binghamton (N. Y.) Railway calls for the operation of forty-two cars in the middle of the day, with twenty-one additional trippers in the evening rush hours, or sixty-three cars in all. Inasmuch as the company possesses altogether only sixty-three closed cars, some of which are always being overhauled and painted, the shop department has a never-ending problem to keep the transportation department supplied with as nearly as possible the full sixty-three cars. If a car is pulled in crippled at any time during the day it must be put back in shape for service again before five o'clock in the afternoon.

A good example of this is furnished by a recent incident. A modern steel car, No. 514, was in collision with a heavy auto truck in the early morning, with the result that the body corner post was stove in, the side sheeting badly crumpled and some glass broken. The car was pulled into the carhouse at about 9:30. Immediately the shopmen set to work. The corner seats were removed and the steel heated in place. Then the blacksmith hammered out the bent steel plates and the seats were replaced. Meanwhile another workman had replaced the broken glass. Next the car was run into the paint shop and a coat of paint applied over the area where the damage had been done. At 4:30 in the afternoon, when the dispatcher called for cars to go out on the road, No. 514 was sent out with scarcely a trace remaining of the morning mishap.

In order to accomplish the quick repairs necessitated by the shortage of cars and to maintain the equipment in the excellent condition for which the Binghamton rolling stock is noted efficient shop methods are required. Two salient points stand out as fundamental principles of policy. In the first place a complete and convenient car index system is used to keep a record of all work done in the shop. Great pains have been taken to make the forms so simple and easy to use that they shall really be time-saving devices. In the second place, an ample number of spare parts for replacement is always on hand. These two factors, each depending upon the other, are the foundation of the maintenance practice.

The primary step in the record system is the "Condition of Car" report, which is made by the car operator whenever he turns in a car at the carhouse. As will be seen in the accompanying illustration, this form provides space to mark any ordinary defect. If no defects exist, the operator signifies that fact by the notation "OK" under remarks. But in any case, whether or not there are defects, a report must be made out when the car is turned in. Severe disciplinary action is taken against a man who fails to turn in a "Condition of Car" card. For that reason, and also because it is so easy to note on them any little defect, these cards are a valuable aid to the mechanical department.

Such a card for each car goes to the night foreman of the shop. He looks through them and at once gets a general idea of the work to be done that night. As a result, he is able to distribute his force of workmen in the most efficient way. But still more important, he knows with reasonable certainty that the job for which he has arranged will be all the work necessary to be done that night. He does not have to fear the discovery just before morning of some defect that was not reported. After all defects have been repaired, the inside of each car is swept and sprayed with West's disinfect-



The Forms Are So Simple and Easy to Use that They Really Save Time

ant. The exterior is dry wiped, and every third night the windows are washed. Brook's renovator is used about once in sixty days to brighten up the paint.

Inspection and overhauling are done on a mileage basis, and here again accurate records play an important part. Every time a trainman turns in a car at the carhouse he must fill out a small slip giving the car number, the route on which he is running and the number of trips he made. A clerk at the office converts the latter figure into miles, and the slips are then filed by cars. An inspection of these slips at any time will show the number of miles run since the date of the last inspection. One thousand miles operation is the basis of inspection and 50,000 miles is the basis for general overhauling.

Each car has a yellow card in the master mechanic's file, showing the date of the last inspection and the date of the last overhauling, as well as the mileage prior thereto. A general overhauling requires three or four days, and one car at a time is taken out of service for this work. Painting is done periodically, once in two years, even though the car retains a fairly presentable appearance. Eight days are required for painting and two cars are always in the paint shop.

An experiment which has proved successful in Binghamton is the use of green headlining instead of white on the front platform. This has materially improved the motorman's vision at night.

A "Record of Inspection and Repairs" card, such as shown in the accompanying illustration, is filled out every time a car is inspected. These cards are filed by car number in the shop and the master mechanic can tell at any time from them the name of the shopman who last examined any particular piece of apparatus on a given car, the condition in which he found it and what repairs he made. This record is valuable in case of breakdown of equipment to determine exactly when and by whom it was previously inspected.

The repairs made when a car is inspected or overhauled are carefully noted on the proper card in the file. Different color cards are used for keeping records of the various apparatus. For example, wheel-record cards are orange; compressor cards, red; carbon-brush cards are blue, etc. The wheel record card is perhaps typical. Like most of the other records, these are filed by car number. The card shows the wheel number, the maker's name, the material, the size when installed and the size when removed, the dates of installations and removal, and the mileage run during the period of service. Other records are kept with similar simplicity and accuracy. The records of such equipment as compressors, however, which are frequently transferred from one car to another, are filed by the manufacturer's number.

Keeping Stocked with Spare Parts

Another phase of the maintenance practice of this company, just as important as that of keeping accurate records, is that of having always on hand an ample supply of spare parts for replacement. These two fundamentals of shop practice are closely linked together because it is the comprehensive record system of past repairs that enables the master mechanic to forecast his future needs. Except for such material as is ob-

tainable locally, it is the general policy to keep on hand in the storeroom a sixty-day supply of parts for replacement.

The value of having this rather unusually large stock of spare parts on hand was well illustrated during the past winter, when five journal boxes were broken in one week. Normally such a number would not be broken in six months, and only the unusually large supply of extras in stock prevented the laying up of several cars. It is claimed also that this practice is economical in several ways. In the first place it permits the immediate substitution of a new part for a damaged one, and thereby forestalls a more serious and more expensive repair job later. In the second place, it permits the storekeeper to make many of his purchases when the market is favorable. The card index plays its part in this end of the business also, as a complete record is kept of all orders, receipts and expenditures for material. For this purpose the ordinary stock card furnished by the Library Bureau is used.

Actual experience has convinced the Binghamton Railway that systematic maintenance is worth much more than it costs. The comprehensive card records really save time and money as well as make easier the task of keeping the rolling stock in first class condition. The high standard of maintenance has helped materially to produce increased patronage and a generally friendly attitude of the public toward the company, as told in the ELECTRIC RAILWAY JOURNAL for May 5, 1923.

Combined Electric Welder and Grinder

Welding and Grinding Equipment Mounted on a Ford Chassis Can Be Moved Rapidly—Both Operations Are Done Simultaneously by Two Men Without Interference

THE welding and grinding of rail joints now constitutes a considerable portion of the track maintenance work of electric railways. The tendency is to provide equipment designed to insure quick transport from point to point and economical handling by few operators. Among the essential requirements for a satisfactory welding and grinding machine are: Easy portability to prevent interference with normal car operation; rapid transportation to and from the job, and operation with a minimum amount of labor.

The mounting of welders and grinders on wheels so that they may be handled to and from the job easily is quite common. Where the welder and grinder are separate units, two men are usually employed for each unit, and when they are hauled by trucks an additional driver is necessary. By mounting both welder and grinder on a 2-ton Ford chassis, Walter Uffert, master mechanic New York & Harlem Railroad, New York, N. Y., has provided for many of the most essential features and has produced a unit that can be handled by two men.



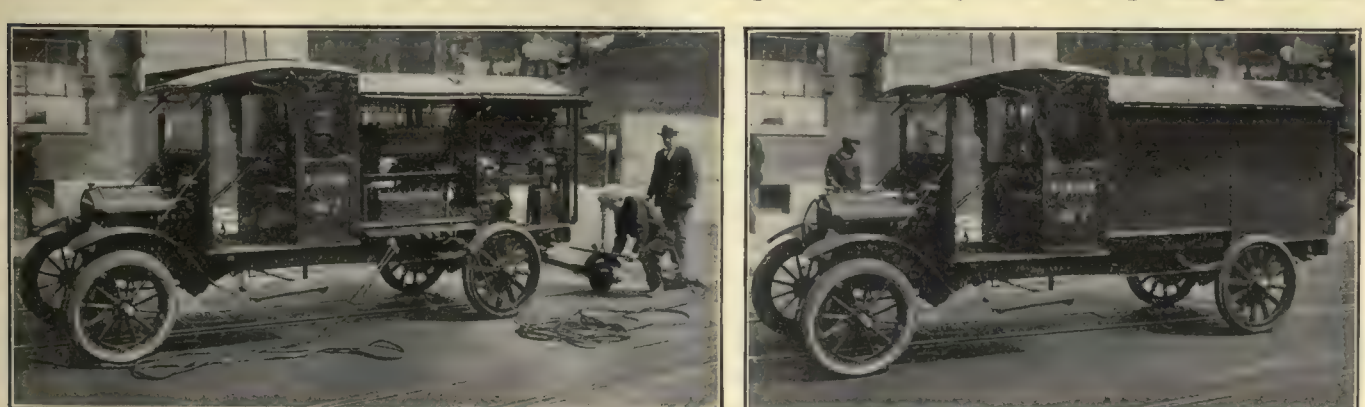
Welding and Grinding Operations Performed at the Same Time

Accompanying illustrations show the equipment at work on a job. Both welding and grinding operations can be carried on simultaneously. Welding leads of 100 ft. in length are provided, so that the welder can work on joints for this distance ahead of the truck. The grinding operation is performed at the rear of the truck so that this can follow the welding without interference.

The welding and grinding equipment is mounted on a substantial angle-iron framework in the rear of the driver's cab. Six frames of grid resistance are mounted in two tiers immediately behind the cab. Circuit breakers are placed in the welding circuit ahead of the equipment and the current graduations are obtained by knife switches.

The New York & Harlem Railroad uses the underground conduit contact system, and current for welding is obtained directly from the contact rails by use of a plow. Four receptacles are provided on the left-hand side of the truck. Two of these are for the plow leads and the other two for the welding leads. Plugs with substantial wooden handles are used for plugging in to obtain the necessary connections. Copper rods with substantial porcelain insulators are used for all connections to the resistor grids and to the switches and circuit breakers. There is thus no danger of charring insulation from too much heat and at the same time this method of construction is neat and compact.

In mounting the grinding wheel, special attention was given to flexibility so that the grinding wheel can



At Left—Receptacles for the Contact and Welding Leads Are Provided at the Lower Edge of the Chassis. At Right—Sheet Iron Curtains Close in the Equipment During Bad Weather and While Being Transported to and from the Job

be removed from one rail to the other and can be pushed backward and forward without the necessity of shifting the truck. A 3-hp. 600-volt General Electric motor is used for driving. This is belted to a countershaft mounted just behind the grid resistors. This countershaft is made of a 7-in. solid axle and has ball bearings. Another countershaft at the rear of the chassis has a loose pulley which slides from side to side. By this arrangement the grinder can be thrown from one rail to the other for grinding as desired without shifting the position of the truck. The grinding wheel is mounted at the rear of an extension arm, which is pivoted at the lower end of a support fastened to the countershaft on which the loose pulley slides. The grinding wheel can thus be shoved ahead or pulled back a distance of 24 in. either side of its neutral position.

The grinding wheel is supported in its normal position a few inches above the rail by a chain and spring attached to a swinging arm. This supporting arm pivots about an upright in the upper center part at the rear of the truck and has a brace running from the outside end to the bottom of the fulcrum. The use of a spring in connection with the suspension of the grinding wheel permits this to be pushed down so as to perform the grinding operation, and when it is necessary to shift the truck the operator needs only to let go of the wheel and it automatically clears itself. The arm on which the grinding wheel is mounted has a bent portion extending over the top of the wheel. This acts as a safety guard for the workman and also provides for attaching a handle to facilitate the grinding operation. All bearings except those on the main driving shaft are equipped with grease cups.

The principal members of the framework are of 5-in. channels. The supports for the grid resistors and for the driving axle are two 3-in. x 3½-in. angles. The smaller members which constitute the side frames are 1¼-in. x 1¼-in. angles. All parts were forged in the railway company's shops.

The sides are of sheet iron arranged to fold up and lie on top of the roof. These give protection to the equipment during stormy weather or when it is being transported to and from the job. The arm with the grinding wheel folds up and is held firmly in position by a hook connection, and the swinging arm supports can be reversed so as to extend inside the covered portion of the truck. A curtain at the rear can be lowered as a protection to the equipment. A circuit of five lights is provided. This not only affords illumination to the equipment during dark periods, but also serves as a warning that the contact shoe is in place so that the operator will not attempt to drive away without removing his plow from the contact slot.

Electrification in Japan

ELECTRIC railroad construction is a live subject now in Japan and the prospects are that by the end of the summer there will be a considerable addition to the miles of electric track in the Japanese Empire. According to the *Japan Times and Mail* of April 28, 1923, during 1922 thirty-three new companies were licensed to construct electric railways that have a total length of 436 miles and nineteen of these companies have begun construction on 83 miles. The same paper publishes a list of railways which electrified 116 miles of line in 1922 and eight other companies licensed to build or electrify 66.8 miles of line.

Devices to Prevent Lamp Theft

A Base that Does Not Fit the Ordinary Fixture May Be Used—Lock Sockets Have Given Satisfaction on Several Railways

THE problem of preventing the theft of lamps from railway cars, stations, etc., is today largely a matter of discouraging those who supply their own homes by stealing the company's lamps. At one time serious losses were suffered because boys unscrewed lamps and threw them in the street for amusement. Occasionally stealing has been done on a regular money-making basis, large numbers of the stolen lamps being resold at a low price to unscrupulous second-hand dealers. Neither of the latter two factors now appears to be of such importance as the theft by people who take lamps for their own use.

Four general remedies for the situation have been tried. The simplest consists in marking lamps in some conspicuous and ineradicable manner. A second plan is to use a base that will not fit a standard fixture. Under these circumstances the lamp is useless to the thief. Lock sockets are a third means of preventing theft. A fourth is the installation of lamps of unusual voltage or wattage, not suitable for ordinary use.

Etching the name of the railway in the glass of the lamp is a long-established custom on some properties. It is no doubt the cheapest of the numerous methods of preventing the theft of lamps. These railways claim that the mere presence of the company's name on the glass keeps people from stealing their lamps. The Bamberger Electric Railroad, Salt Lake City, uses an interesting variation of this idea by marking its lamps "Stolen from B.E.R.R." It must be admitted, however, that etching the name on the glass is not always efficient to prevent serious loss of lamps, and a number of companies favor more elaborate remedies.

Next in point of simplicity is the plan of equipping lamps with an unusual base, so that they cannot be put into the ordinary commercial socket. This may be accomplished by use of a left-hand thread or by other means. Several serious objections exist, however, to the use of a left-hand thread. Such a lamp is used in the New York subway for the 40-volt emergency lighting system to prevent the regular 130-volt lamps from being put into the emergency sockets and vice versa. The experience of the Interborough Rapid Transit Company shows the additional cost to be about 3¼ cents for each lamp. This would be a continuing charge, and if added to the price of all lamps used by the railway would be a formidable annual expense. It is doubtful, therefore, whether the value of the left-hand thread would equal the original cost of altering the sockets plus the increased cost of manufacture.

To change the thread on only a portion of the lamps used by a railway would not be a feasible arrangement. The difference in appearance between the two types would be scarcely noticeable and confusion would be the inevitable result if a stock of each kind was kept on hand. This similarity of appearance would to some extent spoil the plan as a preventive of stealing, for many left-hand thread lamps would undoubtedly be taken under the impression that they were the ordinary type.

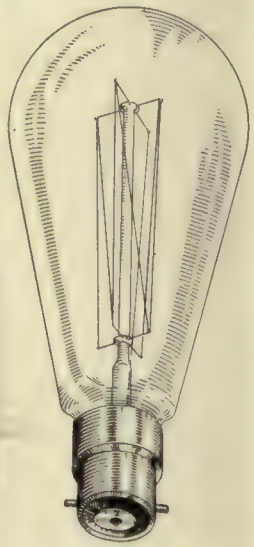
There is, however, a similar expedient which is distinctly more promising. American manufacturers are now making for signal purposes on the railroads lamps with a medium bayonet base, such as is used in Europe. So far as is known, there is no socket for these lamps

now on the market in this country, as the signal manufacturers make a special design for their own work. It is safe to say, however, that the socket makers would be glad to supply the demand if it existed.

The fact that these lamps are actually being manufactured at the present time is a point in favor of the bayonet base plan. From a railway point of view the change from a right-hand thread base to the medium bayonet base would be no more complicated than the change to the left-hand thread. The bayonet base would have the advantage of being readily distinguishable from an ordinary base. No confusion would be caused in the supply and a thief would see at once the folly of stealing such a lamp as it would be of no use.

There are two protective features common to all lock sockets. The first is that it is always difficult, although not altogether impossible, to remove a lamp without using the key. Second, the mere fact that an article is locked fast acts as a deterrent to persons who would not hesitate to grab a loose article. A disadvantage common to all lock sockets is the time required to change lamps. Various types of lock sockets are in use.





G.E. Lock Socket Used in Brooklyn. At Right, Bayonet Base Lamp.

One of these, made by the Benjamin Electric Company, has a slot cut in the side of the shell through which a pointed steel dog is pressed against the lamp base. The dog is so pivoted that it permits a lamp to be inserted without interference, but bites when an attempt is made to unscrew it. A key releases the dog. In the "Arrowlock" socket, the lamp is held fast by a clamp which has to be screwed up by a key after the lamp has been inserted, and must be loosened in the same way before it can be withdrawn.

A General Electric Company lock socket which works on an entirely different principle has been used for several years by the Brooklyn Rapid Transit Company. The feature of this device is that the interior shell of the socket turns freely within the outer casing. Hence a lamp cannot be screwed in or out until a key is inserted to engage the slotted base of the interior shell and prevent its rotation. Because the socket shell simply turns with the lamp, a would-be thief is not tempted to force the lamp and thereby break it. The experience of the B.R.T. shows that the saving of lamps pays for the installation of this lock socket.

Brief consideration of the matter shows that it would not be feasible for railways to use lamps of higher than standard voltage, nor those of lower voltage. The former would be too fragile and the use of the latter with the ordinary 550-volt current would necessitate the connection of altogether too many lamps in a single series. The failure of one lamp would put out half the lights in the car. Moreover, the difference between such lamps and the standard 110-volt lamp would not be very noticeable and many would probably be stolen in spite of their different voltage.

The use of high-wattage lamps, however, is entirely feasible and serves nearly the same end. Many electric railways now use a lighting scheme first tried several years ago by the Cleveland Railway. Five 94-watt Mazda "B" lamps are arranged along the center line of the ceiling of a typical center-entrance car, and a spare lamp is located over the well which can be cut in if one of the other lamps fails. Theft is much reduced because the size of the lamp at once proclaims it to be something different from the ordinary.

Local conditions which affect the theft of lamps must determine the most effective remedy. In general, it may be said that the least expensive of these plans, that of etching on the lamps the name of the company, is likely to be also the least satisfactory. It has, in fact, been given up by many companies that formerly used it. The bayonet base is regarded favorably by the manufacturers, because it is already a standard product, although not largely used in the United States. Its effectiveness to prevent the theft of lamps has not been demonstrated, but expert opinion seems to approve it as the most promising of the less expensive plans.

The other two remedies that have been tried are more expensive. The installation of lock sockets would cost more than the installation of bayonet sockets because the former are a more complicated article. They are, however, effective, and experience shows that on a city property where many chances exist for lamps to be stolen, this plan more than pays for itself. Still more expensive is the scheme of center lighting with large lamps. This, of course, necessitates rewiring the lighting circuits throughout the car, and few railways are likely to favor so ambitious an undertaking for old cars. On new cars, however, it is an excellent device for preventing theft, and affording other advantages.

Track Costs Reduced to Units of Work

In Cleveland the Plan of Basing Costs on Units Done per Man-Hour Has Assisted in Keeping Down Total Expenditures for Maintenance

IN DETERMINING costs of construction and maintenance, it is very desirable to have available some simple basis by means of which a comparison of different methods may be made. With rates for labor and prices of materials changing as rapidly as they are at the present time, total costs do not necessarily reveal the true relative value of different methods unless a new calculation is made for each job to bring them to the same conditions of cost.

In order to simplify such comparisons, and get a true picture of the various methods in use, Charles H. Clark, engineer maintenance of way Cleveland Railway, has studied the various classes of work done by employees in the track department. As a mean of eliminating the various elements subject to fluctuation, all comparisons have been made on the basis of the number of units of any specified operation performed per man-hour expended. To obtain this information an analysis was made of forty-four separate operations. His results, which have been collected and tabulated, are presented in the data given on page 1008.

An examination of these unit figures shows that there are wide divergencies due to the employment of different methods. For instance, operation No. 1, tearing up old pavement, is done in Cleveland by two methods, the first one being by hand, and the second by the use of a special paving plow. The figures show that one man, working by the usual hand method, will be able to tear up 17.3 ft. of stone paving per hour, whereas with the special plow developed for this purpose he can tear up 113.2 ft. of the same paving. The economy resulting from the use of the machine method is so obvious that it is easy to see why the company now does little of this work by hand.

The result of careful study in this manner of methods of construction and maintenance has eliminated many wasteful and inefficient methods. In Cleveland the general application of machinery and labor-saving methods has prevented the cost of the work from rising anything like so high as it would have done had the old methods been retained. The total cost of way maintenance, with labor at 50 cents per hour, is only some 58 per cent greater than the total cost was for doing the same work with the old methods, when 19 cents was the current rate for labor. In other words, wages have increased 163 per cent, but track costs only 58 per cent, in Cleveland.

The Cleveland Railway, Units of Work per Man-Hour, 1922

	Operation	Part of Roadbed	Material	Type of Construction	Units per Man-Hour
1.	Tearing pavement with plow	Track	Stone		113.2368 ft. of track
	Tearing pavement with plow	Track	Brick		143.0674 ft. of track
2.	Clearing pavement	Track	Stone		17.2911 ft. of track
	Clearing pavement	Track	Brick		20.6388 ft. of track
3.	Tearing and clearing pavement by hand	One-half devil strip, track and outside	Stone		2.1267 ft. of track
	Tearing and clearing pavement by hand	One-half devil strip, track and outside	Brick		4.4984 ft. of track
	Tearing and clearing pavement by hand	One-half devil strip and outside	Stone		4.9031 ft. of track
	Tearing and clearing pavement by hand	One-half devil strip and outside	Brick		4.4390 ft. of track
	Tearing and clearing pavement by hand	One-half devil strip, track and outside	Concrete		2.1291 ft. of track
	Tearing and clearing pavement by hand	Outside	Asphalt		2.1672 ft. of track
4.	Tearing and clearing curb		Concrete		18.0761 ft. of track
5.	Excavating; paving charge	One-half devil strip, track and outside	Sand		7.7112 ft. of track
6.	Breaking concrete by hand	One-half devil strip, track and outside	Concrete	Oak ties and sand base	3.4850 ft. of track
	Breaking concrete with pounder	One-half devil strip, track and outside	Concrete	Oak ties and sand base	45.8084 ft. of track
	Helping pounders	One-half devil strip, track and outside	Concrete	Oak ties and sand base	115.2619 ft. of track
7.	Cutting rail with burner				3.4936 cuts
	Cutting rail; helping burner				11.4428 cuts
8.	Digging jack holes		Sand	Oak ties and sand base	1.9851 holes
	Digging jack holes		Concrete	Oak ties and sand base	1.8322 holes
9.	Tearing up rail and ties		Sand	Oak ties and sand base	7.1570 ft. of track
	Tearing up rail and ties		Concrete	Oak ties and sand base	6.9267 ft. of track
10.	Excavating by hand	One-half devil strip, track and outside	Sand	Oak ties and sand base	3.3270 ft. of track
	Excavating by hand	One-half devil strip, track and outside	Sand and concrete	Oak ties and sand base	2.6856 ft. of track
11.	Dapping ties for joint plates		Oak ties	Oak ties and sand base	5.2382 ties
12.	Laying rail			Oak ties and sand base	4.7522 ft. of track
	Laying rail			Steel ties and concrete base	4.2014 ft. of track
13.	Reaming holes with electric drill				9.6711 holes
14.	Aligning track			Oak ties and sand base	45.6980 ft. of track
	Aligning track			Steel ties and concrete base	51.1615 ft. of track
15.	Surfacing track			Oak ties and sand base	17.8755 ft. of track
	Surfacing track			Steel ties and concrete base	8.8081 ft. of track
16.	Filling sand for tamping		Sand	Oak ties and sand base	14.9408 ft. of track
17.	Tamping by hand			Oak ties and sand base	5.0345 ft. of track
	Tamping with electric tool			Oak ties and sand base	6.5781 ft. of track
18.	Finishing sand base for concreting	One-half devil strip, track and outside		Oak ties and sand base	13.0947 ft. of track
	Finishing sand base for concreting	One-half devil strip, track and outside		Steel ties and concrete base	5.0506 ft. of track
19.	Concreting with machine—crossovers	One-half devil strip, track and outside		Oak ties and sand base	4.0302 ft. of track
	Concreting with machine—crossovers	One-half devil strip, track and outside		Steel ties and concrete base	2.5560 ft. of track
	Concreting with machine—side track	One-half devil strip, track and outside		Oak ties and sand base	3.1982 ft. of track
	Concreting with machine—side track	One-half devil strip, track and outside		Steel ties and concrete base	1.9252 ft. of track
	Concreting by hand	One-half devil strip, track and outside		Oak ties and sand base	1.3790 ft. of track
20.	Unloading rail, splices, bolts, etc.		62-ft. rail		79.2255 ft. of track
	Unloading and piling ties		Oak ties		25.9169 ties
	Unloading rail, ties, bolts, etc.		62-ft. rail, oak ties		31.1514 ft. of track
	Unloading rail, ties, bolts, etc.		62-ft. rail, steel ties		39.3192 ft. of track
21	Unloading cement				37.8351 bags
22.	Unloading and shoveling gravel—crossovers				1.7936 cu.yd.
	Unloading and shoveling gravel—side track				1.6073 cu.yd.
23.	Loading dirt by hand—crossovers		Dirt		1.3628 cu.yd.
	Loading dirt and concrete—crossovers		Dirt and concrete		1.5889 cu.yd.
	Loading dirt and concrete—side track		Dirt and concrete		1.1244 cu.yd.
24.	Loading paving blocks—crossovers		Stone		1.9008 cu.yd.
	Loading paving blocks—crossovers		Brick		1.6502 cu.yd.
	Loading paving blocks—side track		Stone		1.8687 cu.yd.
	Loading paving blocks—side track		Brick		1.9313 cu.yd.
25.	Loading old rail, splices, etc.		30-ft. pieces		2.3012 pieces
26.	Loading old ties		Oak ties		11.6839 ties
27.	Laying end rail (for crossover or turnout)			Oak ties and sand base	0.2317 ft. of track
28.	Rolling sand base				52.0027 ft. of track
	Rolling sand base—helping rollers				81.0864 ft. of track
29.	Cutting rail by hand				0.4722 cuts
30.	Repairing tile drain				33.4653 ft. of track
31.	Drip drains				0.3732 drip
32.	Riveting				0.9910 joints
	Helping riveters				5.9269 joints
33.	Welding				0.7576 joints
	Helping welders				3.1850 joints
34.	Laying and maintaining-crossovers				0.0165 crossovers
					13.9382 ft. of track
35.	Laying and maintaining—side track				3.7941 ft. of track
36.	Maintenance of temporary crossings—crossovers				19.1148 ft. of track
					0.1638 crossings
	Maintenance of temporary crossings—side track				17.3028 ft. of track
					0.1185 crossings
37.	Moving tools				38.9246 ft. of track
					0.0222 moves
38.	Laying temporary pavement				3.1912 ft. of track
39.	Cleaning brick				4.0881 ft. of track
40.	Toothing pavement		Stone		34.2417 ft. of track
41.	Cleaning up street (does not include tearing of crossover or side track)				10.0198 ft. of track
42.	Idle time				33.3572 ft. of track
43.	Indirect labor (foremen, bosses, watchmen, etc.)				0.8304 ft. of track
44.	Miscellaneous operations				64.9868 ft. of track

Equipment Maintenance Notes

Boosting Rail Joints

THE plan of placing a length of rail underneath the joint and connecting it at the ends of the angle bars by clips, so as to permit the driving of steel bars underneath the joint to boost it, has been used with some modifications by the Lehigh Valley Transit Company, Allentown, Pa.

This plan was used with an inverted rail, without supporting ties, the old ties having been cut out at approximately the center line of the track and the bracing rail, clips, etc., imbedded in a dry concrete to a depth of some 6 in. below the bracing rail. Good results have thus been secured for individual joint repairs where extensive rehabilitation of tracks was not made.

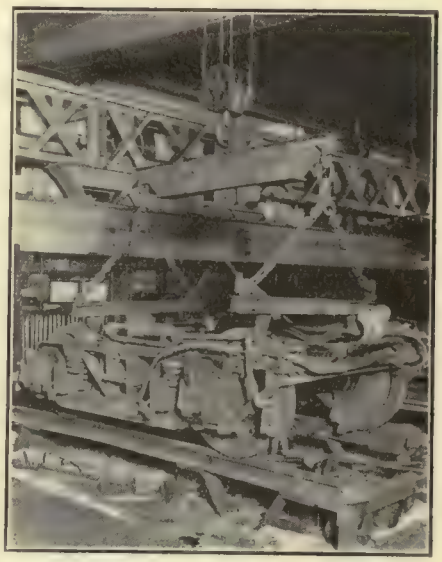
Where an extensive stretch of track was entirely rehabilitated, a supporting tie construction was preferred. Where the rail was found to promise from five to six years longer life, the expense of installing new crossties and a filler block under the rail opposite the joint was thus considered advisable. The accompanying line cut shows this type of construction. The bracing rail is placed with the head side uppermost, of such a length that the repair clips can be placed just outside the end of the angle bar.

A 6-in. x 10-in. filler block, long enough to span two joint ties, is used on the opposite rail, and crossties are installed underneath the entire construction. Stone ballast to a depth of 6 in. is used underneath these crossties. After the joint had been boosted by driving in the supporting steel bars, these are spot welded to prevent shifting. The bolts of the angle bars are renewed and the nuts, together with those on the clips, are spot welded. No lock washers are used. Cupped rail heads are welded and ground off to complete the joint.

Lifting Trucks by the Wheels Prevents Hot Bearings

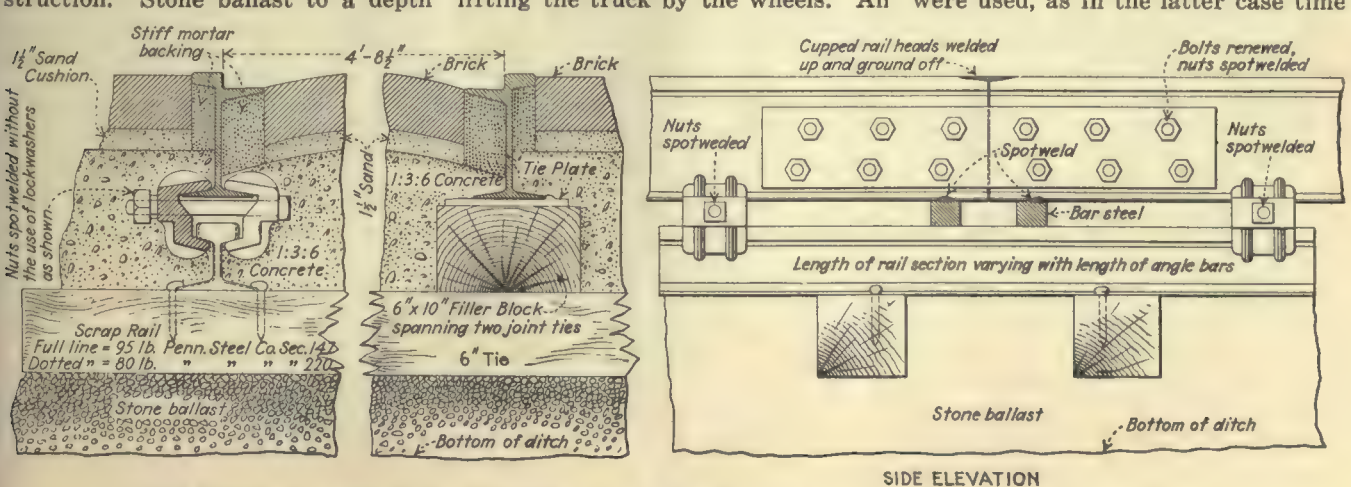
WHEN trucks are overhauled it is the general practice to repack the axle bearings before they are reinstalled under cars. Where the work of overhauling is done by placing the truck on stands or horses, it is necessary to lift the trucks and place them on the track for moving under the car bodies. If this lifting is done by attaching the crane rigging to the truck frame, the weight of the wheels and axles causes the waste to be compressed and may result in hot axle bearings soon after the car is returned to service. With heavy wheels the trucks are also likely to be given excessive strains as a result of the lifting where the rigging is attached to the framework.

In order to do away with the danger of such troubles, the New York Consolidated Railroad, in its Thirty-ninth Street shop, Brooklyn, N. Y., uses a rigging which permits lifting the truck by the wheels. An



Rigging Used for Lifting Trucks by the Wheels

accompanying illustration shows this rigging in place. Two hooked levers fit into the grooves under the treads of the wheels. These have handles projecting outward so that they can be readily adjusted, and their cam-like surface holds them firmly in position when once installed. The two end supports are held together by channels. Chains run from the end supports to links fastened to a supporting beam which has provision for attaching the hooks from the overhead crane. In addition to preventing troubles which may later occur from lifting, this rigging is attached to the trucks much more quickly than if individual chains were used, as in the latter case time



Joint Repairs with Bracing Rail Supported on Ties and Fastened to Operating Rail by Cast Steel Clips

would be consumed in hooking the chains to the trucks, and frequently in order to obtain uniform lifting it is necessary to hook the chains in different positions after a trial lift.

Shunts for Carbon Brushes

BY JOHN S. DEAN
Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company

PRESENT-DAY practice in regard to carbon brushes for modern railway motors is to use a plain carbon without any copper plating and without shunts or pigtails. On some of the older types of motors shunted carbons were originally applied, and



At Left, Imbedded Type of Shunt. Center and Right, Clamped Type

on many properties carbons with shunts are still being used in connection with these old motors.

The most common shunt connection used on the carbons of these old motors is a clamped type which grips the top of the carbon and is held in place by a bolt as shown in the accompanying illustration. With this construction it is a simple operation to replace an old worn-out carbon by a new one; however, there is the likelihood of the clamping bolt not being drawn up tightly by the workman and thus the clamp will make a poor contact with the carbon. A further possible danger which might cause trouble with this type of shunt is that even when the clamp is made tight at the start there is a tendency for it to work loose due to vibration and arcing and thus the shunt soon becomes of little value to help carry the working current to the carbon.

An improved type of shunt which is being used quite extensively in connection with modern industrial motors and generators is also shown in the illustration. This shunt is commonly known as the imbedded type as the end of the braided cable forming the pigtail is imbedded in the carbon. The end of the cable is placed in a hole drilled in the top of the carbon, and a good mechanical and electrical contact is obtained by tamping or ramming a prepared copper compound in the hole between the cable and the carbon to fill the intervening space.

For motors operating with the original type of brush-holders designed for the use of carbons with pigtails, the use of carbon brushes fitted with the imbedded type of shunt in preference to the clamped type is favored. In this connection, admitting that the clamped type may be replaced more readily, operators will find that by using the imbedded connection fewer replacements will be repaired due to a more permanent contact between the pigtail and the carbon brush.

Experience has shown that the detachable or clamped type of shunts are quite often found to be loose in service, thus making a poor contact. Operating under these conditions the shunt might just as well be left off entirely and results in service would not be noticeably changed. In fact, some operators have discarded shunted carbons entirely for their older motors and operating results are very satisfactory. For some of these motors a new brush-holder has been designed to use carbons without shunts. These new brush-holders are fitted with a type of flexible braided shunt connecting the contact tip on the pressure finger with the main body of the brush-holder.

Flat Wire Increases Motor Capacity

THE West Penn Railways, Connellsville, Pa., uses Westinghouse No. 56 motors on its interurban cars. The armatures of these motors were originally wound with round wire, two wires being placed in parallel and connected to the same commutator bar. In rewinding these armatures the company has replaced this round wire with a flat strap, having approximately the same outside dimensions as the two round wires it replaces. This change increases the section of copper 20 per cent. It also cuts the time of winding to but little more than one-half, and produces an armature mechanically stronger and more rigid.

The coils are wound with the strap on edge in a former, which produces a flat coil. After winding and insulating, the coils are pulled out on a machine puller, which opens the sides to give the correct throw and curves them to provide the necessary clearance on the ends. They are then dipped in benolite and baked, which impregnates the inner insulation thoroughly, after which they are insulated with fish paper, dipped and baked again.

The method of pulling the coils makes the loops at the ends parallel with the shaft in a radial direction. These loops are left open, so that a fan action is provided which circulates the air within the motor case. While this is not the equivalent of modern ventilated construction, it is of material advantage in cooling the motor over the original design with the coil ends entirely inclosed. The additional copper, due to the flat wire, also adds to the capacity, so that the motors are able to handle materially heavier loads than they originally were designed to carry.

Reboring Air Compressors

A JIG has been devised in the shops of the Metropolitan West Side Elevated, Chicago, to hold the D-3-E-G Westinghouse air compressor casting for reboring. The simplicity of the jig in construction and the ease with which it is mounted on the carriage of the lathe are the outstanding features of this apparatus.

As will be seen from the accompanying illustration, two angle irons



Mounting of Compressor on Lathe for Reboring

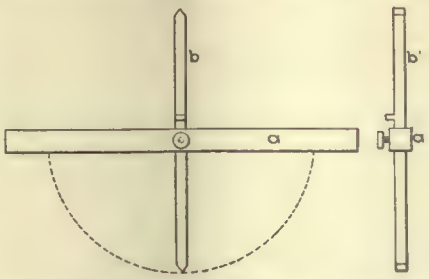
2½ in. x 5 in. form the main support of the jig upon the carriage. Cross members constructed out of 3-in. x ⅝-in. flat iron support a bedplate upon which the air compressor frame is bolted. Through bolts connect this bedplate to the compound of the lathe in such a manner that tight-

ening them up locks everything. Four small dogs hold the main parts of the jig to the carriage. An adjustable prop, also shown, is located directly beneath the cylinders in order to steady them while boring.

In setting up the apparatus for operation the cylinder of the air compressor is brought up flush against the faceplate of the lathe, thus squaring the jig in that direction, while shims are placed under the front bolts in order to square the casting in a vertical direction. Loosening the dogs previously referred to allows the crossfeed of the lathe to be used and the casting can be moved so that the boring bar will align with either cylinder.

Gage for Boring Motor Bearing Housings

WHEN the bearing housings of railway motors become badly worn after considerable use, it frequently is necessary to build up by electric welding and rebore the motor shell to make an exact fit, since the wear, being uneven, usually gets the housing out of true. The West Penn Railways, Connellsville, Pa., has found that the upper half of the frame is usually worn but little, the major portion of the wear coming on the lower portion. All bearings are, therefore, realigned to the upper half of the frame. The parting line is taken as a reference, and all measurements are referred to it.



This Gage Shows the Necessary Clearance and Cut in Reboring Motor Bearing Housings

To facilitate lining up the bearings, a gage is used, as shown in the accompanying drawing. This consists of a bar of steel, *a*, ½ in. square. A square hole is cut in this at its center, and the gage *b* is inserted at right angles. This is of the ¼-in. section, with a small projection near its center. To line up the motor frame for boring, this gage is placed on the frame as shown. The end of the gage, resting on the bearing fit, leaves a clearance between the lug and the crossbar of the gage. This shows at once the amount of the cut that must be taken to bore to the standard diameter, and the tool may be set to approximate this as closely as may be desirable for the roughing cut.

The boring is done with a solid boring bar, having two tools at each end. The first tool gives the roughing cut, and the second, which is placed opposite and slightly behind it, makes the finishing cut. This bar is mounted in a jig which is bolted to the half of the motor frame, so that when the amount of the cut has been determined by the gage the two ends of the frame may be bored out simultaneously. The boring is done on an engine lathe, the boring jig being clamped to the frame and the frame to the lathe carriage. The boring bar is then held to the headstock, and the feed accomplished by means of the carriage, which can be adjusted for any desired feed.

Bronze Linings for Armature Bearings

THE accompanying illustration shows a satisfactory method of relining armature bearings by forcing bronze sleeves into position, as



Armature Bearings and Collars

Top, armature bearing with bronze lining. Left, bronze sleeve before finishing. Right, Axle collar with welded steel face.

used by the Easton division of the Lehigh Valley Transit Company. The sleeve before finishing is shown

You Have to Convince the G. M.

STROLLING down the nicely marked aisle of the machine shop of the Jinxville Electric Railway one morning recently, Bill Jones, the foreman, noticed that "Whistling Dick" Singer, the veteran lathe hand, was not looking as spry as usual. "What's wrong, Dick," he said, "you're all bent up this morning."

"Got a crick in my back yesterday helpin' to lift an armature into place in my lathe. Ole Olson's got a bad hand today, too. Pinched it settin' a motor shell on the bedplate of his radial drill yesterday afternoon."

"Sorry, Dick, that's hard luck!"

"Sorrow ain't enough, Bill. You ought to do something to make it easier to handle things around this here shop. You thought you did a great thing gettin' that radial drill, and it's all right, but there are more labor-savers we ought to have and they wouldn't cost much, either. You ought to get around more to see what they're doin' in other shops, Bill."

"I guess there's something in that."

Approaching Olson, the foreman greeted him: "Hello, Ole, what you been doing to your hand?"

"Dot hand, Mr. Yones, I got caught behind a motor and I yust got one bad smash yet."

"Too bad, Ole. Dick's kind o' laid up today, too, lifting something too heavy for him. You fellows ought to be more careful. It don't pay to get hurt."

"You're right, Mr. Yones, but dem motors' blame heavy. Yes?"

Jones had a thoughtful look on his face as he slipped into the office of William Redfield, the general manager, who greeted him with the query: "Something on your mind, Bill? You look worrried."

"There is that, Mr. Redfield. Two of our good machinists are out of shape today partly because there's too much hand moving of heavy pieces to do around the shop. Ever since I went over to Norfolk and saw the simple and cheap, but practical, jib cranes and trolley hoists in the machine shop there, it has seemed to me we ought to do more of our liftin' and carryin' by machinery. Our shop work is altogether too slow, anyway, and it's mainly because we're doing too much of the horse work by main strength and awkwardness. Ole and Dick might easily have got a serious injury and cost us more than a whole outfit of hoists. They're men I'd hate to lose, too. Dick was talking of quitting the other day because he said he was tired of goin' along 'forever' without any decent tools to work with."

"Well, what do you want me to do about it?" said Mr. Redfield.

"If you would O.K. that purchase order for some new hoists and cranes, it would put us in good spirits again. You see it's pretty hard trying to make a showing for you on low shop costs when we have to do so much heavy work by hand—and run the risk of killin' the men in the bargain."

"Well, Bill, maybe we *had* better do something about it. You send that order over to me again and I'll see if we can't buy the stuff you want."

at the left and the finished bearing at the top. Of course, this method can only be used on bearings where the wall is of sufficient thickness to permit reboring to the extent necessary for inserting the sleeve.

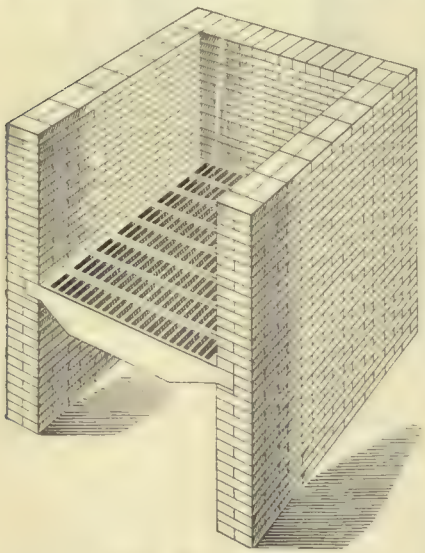
A Westinghouse-306 axle collar is shown at the right in the illustration. This has a steel face welded to it. Originally this type of bearing was provided with a fiber collar.

These methods were developed by C. A. Doud, master mechanic.

Good Combustion for Burning Rubbish

MANY railways burn rubbish, insulation of wires, etc., by placing it in a pile and making a bonfire of it. This method is more or less unsatisfactory, as complete combustion is seldom obtained, and a slight breeze will scatter ashes about the premises.

The Beaver Valley Traction Company, New Brighton, Pa., has developed a very convenient furnace for this purpose that has been found of considerable advantage in getting good combustion and confining the ashes.



Furnace Gets Good Combustion and Confines Ashes

The furnace is built of brick to a height of about 4 ft. above the ground, being open at the top and on one side. At some 2 ft. above the base a grate is inserted in the brick work. This is made of old furnace grates, and while it has openings large enough to permit a good draft, very little ash sifts through.

One use of the furnace that has shown its value is in burning insulation from scrap wire in order that the copper may be reclaimed.

Convenient Type of Welding Room

THE welding room in the Madison Street shops of the Lehigh Valley Transit Company, Allentown, Pa., is in the middle of the shop and is served by an overhead traveling hoist.

Tracks also lead to the opening which, in the accompanying illustration, is shown curtained at the left so that heavy parts can be brought alongside the welding room and handled directly from cars into position for welding. This welding room has openings on three sides for convenience in handling material. These openings are closed with sliding curtains which can be readily folded back to permit bringing in material.

The floor of the welding room is provided with trap doors, through which irregular parts of unwieldy pieces can be allowed to project, so as to facilitate the placing of work for welding.

A closet in the left-hand corner of the welding room is used by the operator for his clothing and also for locking up the various welding tools used. A small rack at the side of this small room has shelves for various types of welding rods. Portable tables and stands are used for the convenience of the welder to hold his tools in position so that they can be reached without inconvenience while he is working.

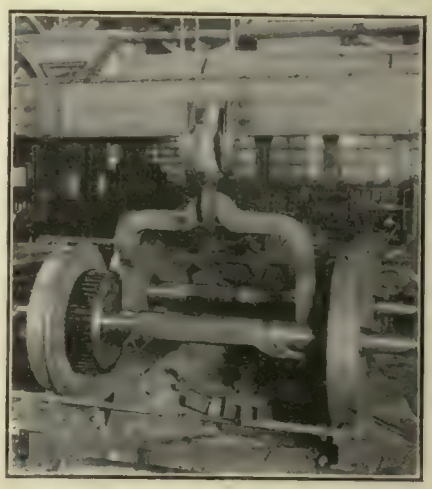
The back of the room is occupied by a lathe with gearing and belting used for building up axles and flanges of wheels, as described in a separate article. (See issue of ELECTRIC RAILWAY JOURNAL for June 9, page 974.



Welding Room in Shop of Lehigh Valley Transit Company

Safety Attachment for Lifting Wheels

WHERE wheels are lifted by attaching a chain to the crane hooks, there is danger of this chain slipping and causing accidents. The accompanying illustration shows a device used in the Thirty-ninth Street shop of the New York Consolidated Railroad for lifting wheels which has proved a great time saver and also eliminated danger of accidents. The lifting rigging is made of ½-in. x 6-in. flat iron and is shaped

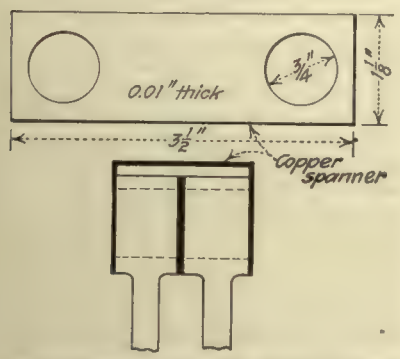


Equipment Used for Lifting Pairs of Wheels in Brooklyn

so as to provide a sling to go underneath the center part of the axle. The upper section has a notched portion in which the hook from the overhead crane fits to keep the crane block centered.

Insuring Proper Contact Between Resistor Grids

TROUBLE is frequently experienced from improper contact between the various grids of car resistors. A common method is to use several copper gauze washers between



Copper Spanner Used for Joining Grids

the grids which are to be connected. The accompanying illustration shows a form of copper spanner which is placed on the outside of two adjoining grids and has been used with considerable success by the Cleveland Railway. It is supplementary to the copper washers.

These spanners are punched out of thin copper and are 1⅛ in. wide by 3½ in. long and 0.01 in. thick. Two holes of sufficient diameter to fit over the insulated rods supporting the grids are punched at either end of the spanner.

Painting Machine Tools to Improve Lighting

IN THE machine shop of the West Penn Railways at Connellsville, Pa., the plan has been adopted of painting all machine tools and other fixtures about the shop with a white gloss paint, in addition to painting walls and ceilings the same color. The use of the white paint on the machines has an important effect in assisting to light up the shop. This not only gives it a more cheerful appearance, but it encourages a higher grade of work on account of the ability of the workmen to see close work better. There is less danger of accidents, as the darker metal parts being worked on are more conspicuous against the general light tone of the shop.

New Equipment Available

Convenient Car Signal Push Button

AN ACCOMPANYING illustration shows the type of car signal push button being marketed by the Fahnestock Electric Company, Long Island City, N. Y. These are designed for high-voltage signal systems using the trolley circuit and are arranged for installation on the window posts. The casing is of insulation composition with no metal parts exposed. The well-known Fahnestock



High-Voltage Push Button, Switch

connectors are used, which enables quick disconnecting of leads without the use of tools. This feature is considered of value for the push button switch, so it can be removed readily for painting or repairing purposes.

New Type of Lantern

THE V. & N. Lantern Company, Inc., New York, N. Y., has recently brought out a new type of lantern for safeguarding building or railway construction work where a red light is needed as a danger signal. A solid ruby globe is used inside the clear glass globe, this colored globe being screwed tightly into a collar so that it can be raised and lowered by means of a lever and spring. The releasing of the lever causes the red globe to rise by the spring action. The movement is slow so as to minimize the danger of breaking. If a white light is desired, the lever is pulled all the way down and latched.

The lantern frame is made of cold rolled steel, tinned or galvanized, or of solid brass or gun metal, as desired. Particular attention has been given to the construction of the fuel tank and burner. Either signal oil or kerosene can be used, according to the burner desired. The construction is such that it is impossible for the light to be blown out by the wind. The lantern burns for more than twenty hours with one filling.

No Weak Spots in Seamless Tape

A SEAMLESS bias tape recently put on the market by the Irvington Varnish & Insulator Company has several advantages for use in wrapping armature coils. It is a varnished cambric tape cut by a special process from a continuous woven roll of fabric, and it is therefore of uniform thickness throughout. The inconvenient bulkiness of the ordinary seam is thus eliminated and there are no weak spots where two pieces are sewn together.

Device for Chucking Irregular Shapes

A NEW universal vise for chucking irregular shapes in lathes has just been placed on the market by Bruce, Dawson & Co., London, England. This is of Swiss manufacture and will grip irregular shapes in the lathe with a single movement.

The vise contains a number of jaws which are operated by the turning of the handle. These jaws have an individual spring action and can be tightened until they touch all over the piece to be held. Two large nuts on the sides are then used to tighten the chuck so that the relative position of the jaws is fixed.

The vise is designed so that it can be bolted directly to the bed plate, table or slide of any standard machine tool in the same manner as is used with an ordinary vise.

It is supplied in three different types, one with a rectangular base for various machine tools, a second for use on lathes and a third for attachment to a bench vise.

Association News & Discussions

Utility Advertising Given New Impetus

Publicity and Advertising Men Hold First Meeting of New Organization Independent of the Utility Associations and Under the Auspices of Organized Advertising Men

THE first annual convention of the Public Utilities Advertising Association, held at Atlantic City, N. J., last week, in conjunction with the annual convention of the Associated Advertising Clubs of the World, with which the former is affiliated, represented the initial definite and concerted action toward bringing the major public utilities of the country under the banner of organized and systematic advertising.

Specific plans were outlined by the directors of the new association for presenting the needs and advantages of the use of the printed word in gaining the sympathetic understanding and support of the people. The principal feature of the plan is to secure the co-operative support of the various utility associations, state committees on public utility information and individual public service corporations which are now using advertising regularly, with a view of convincing the non-advertising utilities of the practical and economical value of paid advertising in making their own problems easier of solution.

The various speakers appearing on the convention program laid emphasis on the extraordinary value of regular and persistent advertising for all kinds of utility corporations for the same reasons that have made advertising the greatest motive power in modern business of all kinds. Considerable attention was also given by the speakers to the need on the part of electric railways, gas companies, light and power enterprises and telephone companies of devoting more thought and energy to the business of developing good will on the part of the customers of these utilities through the medium of truthfully told advertisements.

Veteran advertising experts and publicists contributed valuable papers on the four definite kinds of advertising that are of particular interest to the public utility industry at the present time, these four being as follows:

1. Service advertising to gain volume by exploiting advantages and uses of the service.

2. Merchandise and appliance advertising, in the case of electric and gas companies, to sell goods at retail.

3. Financial advertising to sell the securities that must be disposed of to provide the necessary extensions and additions to plant and equipment.

4. Institutional advertising to lend background and support to the other three.

It was pointed out that the youth of the public utility industry is probably one reason why its advertising methods and practices are not farther advanced, when its field is so inviting. No branch of the industry except gas service is more than forty to forty-five years old, and the gas service, as we have it today, primarily for domestic and heating purposes, is no older. This business has grown amazingly fast. Companies have had to concentrate upon providing the physical facilities required to satisfy public demand for their service. Hence, the need or desirability for advertising has not been acutely felt as it would be in manufacturing, and especially in a young merchandising business.

Another reason presented for the backwardness in utility advertising was that the advertising fraternity itself had been blind to the opportunities offered for promoting and developing business among the utilities. Consequently, public utility advertising has lacked the stimulus of contact with promoters of advertising.

The possibilities of development of systematic advertising among the public service corporations was shown by one of the speakers who called attention to the fact that if the individual companies embraced in the four major utilities expended only one-half of 1 per cent of their annual gross for advertising, it would represent the impressive sum of nearly $20,000,000 a year.

In outlining the origin and development of the present movement, W. P. Strandborg, president of the association, prefaced his report by stating:

"For practically seven years the advertising fraternity in the public utility industry has been nothing more nor less than a bunch of maverick steers roaming the range and milling around trying to horn into the regular herd. We have finally stampeded into the corral and have been branded by the eagerly sought identifying monacker 'O A,' meaning 'Organized Advertising.'"

One of the most impressive features of the convention was the splendid display of utility advertising material. It was assembled and installed under the joint auspices of the three great national utility organizations — the American Electric Railway Association, American Gas Association and the National Electric Light Association, with a number of individual telephone exhibits. The display was unquestionably the most comprehensive and representative utility advertising exhibit ever assembled. It embraced a total of 720 sq.ft. of space, making it one of the largest and most attractive units in the international exhibit. Principal credit for this remarkable presentation of the work of the utility industry is due to E. J. Cooney of Lowell, Mass., who was chairman of the exhibit committee.

At the business session of the convention the following directors were re-elected to serve for three years:

Labert St. Clair, director advertising section, American Electric Railway Association; George F. Oxley, publicity director National Electric Light Association; Charles W. Person, secretary publicity and advertising section, American Gas Association.

W. P. Strandborg, Portland Railway, Light & Power Company, Portland, Ore., was re-elected president; J. C. McQuiston, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., was re-elected vice-president, and B. J. Mullaney, Peoples Gas Light & Coke Company, Chicago, was continued as treasurer.

Frank LeRoy Blanchard, J. C. McQuiston and B. J. Mullaney were re-elected delegates to the National Advertising Commission, and Mr. Blanchard was chosen to represent the utility industry on the joint assembly of the Associated Advertising Clubs of the World.

The report of the secretary showed that in less than six months the association had secured a membership of 169 men engaged in the publicity, advertising or public relations work of the utilities, representing thirty-three states of the Union and three Canadian provinces. Plans are now under way to increase the membership to 1,000 by the end of the year.

PAPERS AND DISCUSSIONS DIGESTED

James O'Shaughnessy, executive secretary of the American Association of Advertising Agencies, gave an informal talk in which he outlined the economic advantages to be derived from co-operation between a reputable, well-organized agency on the one hand and a public utility company which has no established advertising department on the other. Mr. O'Shaughnessy contended that the company which desires to start its advertising activities on a sound business basis can not only save money but can also accomplish very

much more effective results through consultation with an agency which has made a specialty of analyzing public utility organizations and their problems than to "go it alone." He advocated persistency in advertising, also the use of the various recognized media, and called attention to several effective campaigns that had been handled through co-operation with agency people.

The necessity for advertising during prosperous times in order to cultivate the public good will, which may be greatly needed in time of trouble, was the thought running through speeches made at the session. The public utilities field offers an invitation to the best brains in advertising according to Bernard J. Mullaney, who presided, but up to the the present the advertising profession has muffed this opportunity.

The old attitude in the public utility business was, "Here is the service, come and get it." This, he said, has changed, and advertising should rank as a major item of utility company activity and of legitimate operating expense, recognizable as such, along with cost of material and labor, by state commission or other regulatory authority.

Even uniformly good service in time ceases to cry out in its own behalf in the opinion of G. C. Maxwell, former secretary of the Ohio Public Service Commission, and it follows that a public utility company should continually remind the people that the service is good and tell them why it is good. Tell the story of the men with faith who invested of their means, he said; tell the story of the men with vision who struggled for the achievement of an ideal; tell of the army of men and women who daily go about tasks to make the giving of service possible; tell of plans for future development and even further perfection of service. If, on the other hand, there are difficulties which make the attainment of the ideal of service impossible, frankly tell the public so. Tell them what the difficulties are. If further patience and co-operation from them are necessary, boldly ask for it.

The best way for a public utility to advertise is to start with a public safety campaign, according to W. H. Boyce, general manager Beaver Valley Traction Company. That will get the public accustomed to seeing the name of the utility in print, and will not excite suspicion. Afterward good-will and public relations copy may be added advising patrons of the cost of the cars, cost of special work, and cause of delays. Wherever an opportunity exists for criticism on account of shortage of power or uneven track conditions, or shabbily appearing cars, the force may be taken out of the blow by self-criticism, at the same time giving an explanation of why such conditions exist.

The great mistake made by a number of companies, he said, is that they do not start to advertise soon enough. They wait until a fight is on in regard to their franchise, an increase in fare, or some other important problem, at which time a large portion of their riders have formed unfavorable conclusions before the company had presented any part of its side of the case.

A public utility company often neglects to adopt publicity methods, thinking it is saving money, said P. H. Gadsden, vice-president of the United Gas Improvement Company. Then some crisis in the company's affairs arises and immediately there is a frenzied resort to newspaper advertising in the futile effort to reach the public ear—in the vain hope that having neglected to cultivate the public all along, they will listen sympathetically at such a late date to the company's case. This kind of publicity under such circumstances is of little benefit. It is almost a waste of money. Publicity to be really effective must be continuous, sustained, day in and day out.

There is much to tell the public about the service of the utility in the opinion of J. C. McQuiston of the Westinghouse Electric & Manufacturing Company. Each message should carry one specific thought, and the messages should be continuous and not spasmodic. If a utility company uses paid space in the newspapers only when agitation is on foot for a new franchise or when rates must be advanced or when for some other reason that which smacks of a favor asked of the public, then, quite naturally, the public becomes suspicious. Carry the message to the public continuously with a definiteness of purpose. Constant pounding wears away any obstacle in time. If we can so educate the people that they will understand us and support us, he said, we need have no fear of unscrupulous politicians who delight in using the public utility as a political football.

Speeches were made at the same meeting by W. S. Vivian, Middle West Utilities Company; F. H. Sisson, Guaranty Trust Company, and W. H. Hodge, Byllesby Engineering & Management Corporation.

Speaking on "What Advertising Has Done and Can Do for the Public Utilities" at the general session of the advertising convention Floyd W. Parsons, the writer, said that:

"During the war, when the government was obliged to classify the nation's businesses in the order of their indispensability, the people in Washington made the remarkable discovery that practically all of our industries believed they were vitally essential, and were able to produce pages of proof to support their claims. The motion-picture people said that recreation was necessary to keep up morale. The cement people insisted we must go on with our road building. Thousands of manufacturers, running all the way from the makers of motor cars to the producers of toys, showed how life would never be the same, and our fighting efficiency would be materially lowered, if they were compelled to curtail their activities.

"But the utilities did not have to prove their case, and, in keeping with what was up to that time their established policy, they did not try. Of course, a few utility men went to Washington and co-operated with Federal officials, but the fact remains that arguments were unnecessary to show the necessity of keeping utility operations normal. However, the average citizen has become so accustomed to the services the utilities render that now he merely takes them for granted, and the gravest mistake that has been made by our public service executives has been their long submission to this state of public indifference."

Program of the Canadian Association

A TENTATIVE program for the Canadian Electric Railway Association convention in Toronto, June 27 to 30, has been announced. The meetings will be held in the Phonograph and Press Buildings at the Toronto exposition grounds. The headquarters of the association will be the King Edward Hotel.

At a luncheon on Wednesday the president of the association will make his address and the report of the secretary, treasurer and committees will be heard in the morning. The afternoon will be devoted to an examination of exhibits.

On Thursday morning a paper entitled "Deciding on the Proper Motor for a Given Cycle of Duty," by W. G. Gordon, railway engineer Canadian General Electric Company, will be presented. Mayor McGuire of Toronto will address the members at luncheon. The afternoon will be devoted to exhibits again, and in the evening there will be a banquet in the King Edward Hotel.

On Friday morning a paper will be presented by Alexander Jackson, Public Service Railway, Newark, N. J., on "Operation of a Scientific Survey of Traffic Movement for Urban Railways." In the afternon attention will be devoted to exhibits, and in the evening there will be a dinner-dance at the Yacht Club. The election of officers will take place Saturday morning.

Missouri Operators Discuss Railway's Future

THE outlook for street railways was considered at the seventeenth annual convention of the Missouri Association of Public Utilities, held on the river boat *Harry G. Drees* May 23 to 25, 1923. A comprehensive paper by F. G. Buffe, general manager, Kansas City Railways, was read in his absence by H. H. Kuhne. After reviewing the past troubles of railway operations, Mr. Buffe listed the favorable elements in the future development of railways, namely, the fact that service-at-cost is here to stay; the improvement in relations among management, employees and the public; the conviction that street railways are necessary for mass transportation; the need of securing relief from indirect taxation; the realization that although speculative returns are gone, a fair interest return on

capital actually invested will be not only permitted but encouraged, and, finally, that operating methods have advanced and will continue to advance.

B. W. Frauenthal, St. Louis, expressed the feeling that the best way to work out the problems of the future is by continually bringing these problems to the public's attention, since the utilities' most serious obstacle is public ignorance of these problems. E. A. Hart, Cape Girardeau, spoke of his troubles in maintaining local service with poor equipment until a refinancing two years ago warranted the purchase of new equipment, and a right to operate with a 7-cent fare insured greater income. He considered such a service as an important part in the economic development of small towns, but felt that unremunerative service could not be furnished indefinitely without becoming a detriment to the entire community. E. J. Walsh, United Railways of St. Louis, said that he considered unjust the requirement that a railway assume the expense of paving between the rails. He also made a strong plea to the executives, urging them to serve as jurymen rather than "pass the buck" to men of lower caliber. He argued that unless the individual citizen gives more thought to his duties as an American, there will be an increasing danger of drifting away from the principles laid down by the authors of the constitution.

California Electric Railway Association Elects Officers

AT THE annual meeting of the California Electric Railway Association, held in San Francisco on June 4, officers elected for the ensuing fiscal year were: President, Charles N. Black, Market Street Railway; vice-president, H. A. Mitchell, San Francisco-Sacramento Railroad; manager, W. V. Hill. The executive board was increased from five to seven members, the new board consisting of C. N. Black, W. A. Alberger, John A. Britton, Paul Shoup, W. E. Dunn, H. A. Mitchell and Claus Spreckels.

Program of New York Meeting

FOR the annual meeting of the New York State Electric Railway Association at Hotel Champlain, Bluff Point, Lake Champlain, New York, June 23, the program has been arranged as follows:

Annual report of President Benjamin E. Tilton.

"Industrial Relations, Unemployment Compensation and Old Age Pensions," by James E. Kavanaugh, vice-president Metropolitan Life Insurance Company.

"What the Outsider Wants to Know," by Edward Hungerford.

"Telling the Electric Railway Story to Bill Jones," by W. Dwight Burroughs, purchasing agent United Railways & Electric Company, Baltimore, and president Advertising Club of Baltimore.

"Co-ordinating Bus and Trackless Trolley Transportation with Electric Railway Service," by W. B. Potter, chief engineer railway and traction department, General Electric Company.

Election of officers.

The speaker for the evening banquet will be J. Herbert Case, deputy governor Federal Reserve Bank of New York.

Public Ownership Conference in Toronto in September

THE proposed program has been announced for the Public Ownership Conference to be held at King Edward Hotel, Toronto, Ont., Sept. 10-13. The addresses to be made will cover practically all phases of public ownership. On the afternoon of Sept. 12 Delos F. Wilcox will discuss the question "Why Cities Should Own Their Own Utilities." He will be followed by representatives of the cities of Toronto, San Francisco and Detroit, who will talk on the question "Municipal Street Car Lines." It is hoped that all of the thirty cities in the United States and Canada which now run their own railways will have representatives present who will engage in the discussion. Edward F. Dunne, former Governor of Illinois, is expected to talk on the subject "Prospects for Public Ownership in Illinois, with Special Reference to Chicago Street Car Lines." Cornelius Sheehan, commissioner of gas, water and electricity in New York City, has been asked to discuss "The Failure of Regulation in New York City." Charles P. Steinmetz of the General Electric Company will talk on "The Possibilities of Hydro-Electric and Superpower Development."

American Association News

Buildings and Structures

THE committee on buildings and structures of the Engineering Association met on June 8 in New York. Consideration was given to replies to a questionnnaire received from 106 companies on prepayment and post payment inclosures. This includes the consideration of various types of passimeters, turnstiles, fare booths and cashier systems.

The report on the design of small bridges, culverts and trestles was considered with a view to presenting good current practice.

The meeting was attended by N. E. Drexler, chairman, Hampton, Va.; and C. W. Burke, Brooklyn, N. Y. R. C. Cram, sponsor of the committee on way matters, was also present.

Special Reports Available

THE following special reports have been prepared by the Bureau of Information and Service, American Electric Railway Association, and are available to member companies in good standing upon request:

Motor Vehicle Legislation Enacted in 1923.—Copies of all legislation affecting the operation of motor vehicle common carriers passed by the various state Legislatures in session in 1923, with an analytical summary of their principal provisions.

Trend of Electric Railway Operations.—A month by month statement of the combined revenues, expenses, net revenue, taxes, car-miles and revenue passengers of eighty-one companies reporting to the American Electric Railway Association, beginning with the month of January, 1922, and giving a comparison of each month's operations with the operations of the same month of the previous year.

Motor Truck Operating Costs.—Operating figures derived from various sources showing the costs of operating different types and sizes of trucks in a number of different lines of business.

Valuation Decisions.—Abstracts from recent commission decisions in cases in which the valuation of an electric railway's property was an important factor, bringing out the principles which the commission followed in determining the valuation.

Revised List of Companies Operating One-Man Cars.—A new edition of the list issued April 1, showing the number of cars operated by each company, checked and revised in the light of later information, together with a complete income statement and detailed statement of operating expenses per car-mile of a group of companies operating one-man cars exclusively.

In addition to the above compilations, supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies have been prepared, bringing them up to date.

Valuation Committee

A MEETING of the valuation committee of the American Association was held in New York on June 4. Tentative reports of the sub-committees on price trends and on the relative weight to be given various methods of valuing properties were presented. In the study made by the latter sub-committee of decisions by various commissions and of communications from the commissions discussing their methods it appears that there is a leaning toward giving very substantial weight to reproduction costs on the basis of present prices. The sub-committee on price trends had included in its work since the last meeting a curve showing the trend of prices of the electric railway materials and equipment.

Those present were L. R. Nash, J. A. Emery, W. H. Maltbie, Prof. A. S. Richey, J. F. Hamilton, C. S. Klumpp, Frank Silliman, Jr., H. A. Clarke and C. W. Young, representing W. V. Tuttle.

The News of the Industry

Board Hears Plans

High-Speed Development in Philadelphia Estimated at $200,000,000—Mitten Discusses City's Subway Needs

The second meeting of the Councilmanic Transit Commission of Philadelphia was held in the City Council chamber on June 12. The members of the commission were present, as well as Ralph T. Senter, vice-president of the Philadelphia Rapid Transit Company, and S. M. Swaab, who, with Mr. Twining, are the conferees on the proposed high-speed lines.

The proposals submitted indicated that conferences between Mr. Senter and the city Transit Director were leading toward a solution of the traction difficulties. One new proposal of the transit company's engineers and regarded by the city engineers as practicable was for a surface subway on Locust Street to carry into the business center the three West Philadelphia lines. The adoption of this plan would mean the relief of present surface congestion in the center of the city.

The principal feature of Mr. Twining's proposal was four tracks in Broad Street to Arch Street, instead of a diversion into Ridge Avenue with two tracks. That would do away with the Ridge Avenue loop and promote express service as far as Arch Street, he said.

Near the close of the session there was some talk about costs, and Mr. Senter estimated that the cost of the high-speed development would be from $200,000,000 to $225,000,000, according to the transit company plans. Mr. Twining's estimate for his plan, including the extension to Darby, was $100,000,000.

The Councilmanic meeting came the day following a session before the Public Service Commission, where Thomas E. Mitten, chairman of the board of directors of the Philadelphia Rapid Transit Company, told the commission that Philadelphia needed not less than $100,000,000 as the first move to meet the subway requirements and that the city's borrowing capacity was insufficient to obtain the money without a pledge from the operating company to pay the rental. The commission, sitting as a whole all day, considered the argument on the rate of fare and the value of the company's property.

Samuel Rosenbaum, assistant city solicitor, attempted to show that the company was making excess earnings of $5,400,000, which should be turned back to the car riders in the form of a reduced fare. Mr. Mitten declared that upon the credit engendered by the 7-cent cash fare and four tickets for 25 cents, the Philadelphia Rapid Transit Company had undertaken a $10,000,000 program of improvements, which included new cars, crosstown feeders, trackless trolleys and motor buses, and that the company was planning further improvements which would make the surface system a credit to, as well as a feeder of, the city-built subway to come. Further, he argued that subways were the immediate need of the city and company, since the city could not develop its home-building outskirts without city-built subways, nor could the Philadelphia Rapid Transit accommodate its 50,000,000 added passengers per annum without subways to provide uninterrupted service throughout the delivery district. In his talk to the Commission Mr. Mitten said:

> P. R. T. economies, resulting from cooperation of men and management, approximate $16,000,000 per annum, which is the reason why the cash fare is but 7 cents in Philadelphia, as against 10 cents in Pittsburgh.
>
> P. R. T. has proved to its own satisfaction that the present cost of reproducing its property exceeds $300,000,000, which, at only 7 per cent, would entitle it to $21,000,000 of return per annum. If P. R. T. received in reward but one-fourth of its proved economies, then $4,000,000, thus added, would make P. R. T. entitled to $25,000,000 of annual return, or more than double the amount which it now distributes by way of interest, rentals and dividends on P. R. T. stock.
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> The city, in its most extreme claim, attempts to show the company is being entitled to but little more than $9,000,000 per annum as a return on original cost. If we add to this unduly shrunken amount but one-fourth of our proved economies, $4,000,000, the total annual return to which P. R. T. is entitled would be $13,000,000, which is more than the company at present receives as a return upon the capital invested, and, in fact, is all that the present 7-cent cash—four tickets for 25 cents—fare can now be made to produce.

Coleman J. Joyce, counsel for the transit company, then gave some facts on the cost of reproducing the company's property and fixed the value of the property at $316,423,557. For the city, Mr. Rosenbaum contended that the value of the property, based on the original cost, should be $130,000,000. Mr. Joyce argued for an 8 per cent return and Mr. Rosenbaum thought 7 per cent sufficient.

Wage Agreement Being Negotiated by Interborough

Preliminary discussions have begun between the officials of the Interborough Rapid Transit Company, New York City, and representatives of the employees with a view to extending or modifying the existing wage agreement which expires June 30. Present wage schedules were accepted by the employees in July, 1921, to be effective for one year. The period of the agreement was extended in July, 1922, for twelve months to June 30, 1923.

Arbitration to Decide

Dispute of Tri-City Railway Demanding Seventy-five Cents an Hour Must Go Before Three Boards

Boards of arbitration will shortly consider the wage demands of the trainmen employed by the Tri-City Railway. Negotiations covering both the Iowa and Illinois lines of the company and the Clinton, Davenport & Muscatine interurban as well have been in progress for the past six weeks and have resulted in an impassé which arbitration has been called on to remove.

The men, now drawing a top scale of 55 cents an hour, have asked for a wage of 75 cents an hour. The company has declared its inability to pay this increase and, following various proposals, among which was the offer of a slight increase to the Iowa trainmen, arbitration has been invoked.

The company recognizes the union locals, but does not recognize the International Association, with which the unions are affiliated. The International has had an official in Davenport for several days advising with the union locals, but this official has not attended any of the conferences between the men and the traction line officials.

For the companies, R. J. Smith, general manager of the Tri-City Railway of Iowa; T. C. Roderick, general manager of the Tri-City Railway of Illinois, and Clarke Anderson, head of the Clinton, Davenport & Muscatine interurban, have been conducting the wage negotiations. These negotiations have now extended longer than the period covered by the old contract, which expired June 1. An agreement has been made between the men and the company, however, by which the finding of the arbitrators will be retroactive to that date.

The wage scale is to be settled by three separate boards, one to fix the wage on the Illinois lines, one to decide the scale for the Davenport city lines and one to determine the rate of pay for the interurban trainmen.

No strings are tied on this arbitration agreement, the finding to be binding on each party and evidence of any pertinent nature to be considered. The men at first asked that 55 cents be established as a minimum wage, below which the board of arbitration would not go in its consideration of the scale. This attitude, however, was later abandoned.

Last year the men voted to accept a company offer and the scale was settled in a short time. Two years ago the wage went to a single board of arbitrators for the three lines.

Pittsburgh Railway Report Expected by Sept. 1

As a result of the termination of the argument on the reorganization of the Pittsburgh Railways on June 11, Special Master Henry G. Wasson will submit his recommendation to the court prior to Sept. 1. This is the final date set by the State Public Service Commission for the completion of the reorganization.

Attorney A. W. Robertson, counsel for and vice-president of the Philadelphia Company; City Counsel C. K. Robinson, and Attorney E. W. Smith presented the arguments in behalf of the proposed organization, to which there was no opposing argument. The attorney for Receivers Fagan, George and Tone said that they had placed all records at the disposal of the investigation.

At the meeting before Special Master Wasson at his office in the Frick Building, Attorney Robertson reviewed the progress of the railway company during the five years it has been in the hands of the receivers. Attorney Smith called attention to the fact that if a reorganization is not effected now, it may be some time before circumstances for such a plan are so favorable. If the master's report is contrary, the agreement with the city will be abrogated and the plan of deferred payment will fail. Attorney Robinson in behalf of the city urged a speedy reorganization.

In connection with the company's reorganization it was brought out by Arthur W. Thompson at a previous meeting that two modifications of the present carfare of 8½ cents now being charged by the railway were being considered by officials of the company. These changes were a slight reduction of fare at times other than rush hours and a reduced fare for school children. He said further that it was the plan of the company to expend $5,000,000 more for better equipment, $3.000,000 for 300 new cars and $2,000,000 for the improvement of lines, carhouses and other parts of the service. He took occasion to praise the work of the receivers and said that they were naturally handicapped by the conditions of the receivership which restricted expenditures for improvements.

Working Agreement Signed—Wages to Be Arbitrated

A new working agreement between the Connecticut Company and the Union was signed on June 7 while the question of an increase in wages on which there was a split was sent to arbitration. President Lucius S. Storrs and General Manager John K. Punderford signed the working agreement on behalf of the company while the state conference committee of the local unions signed on behalf of the men. The action came at the conclusion of a joint conference.

The men rejected by a large vote several days ago the offer of the company for an increase of 4 cents an hour. The company at the conference on June 7 declared that its financial burdens would not permit a greater increase than 4 cents an hour while the union representatives maintained the company was financially able to increase its offer.

When it became evident that agreement was impossible at this time both sides decided to turn the matter over to a board of arbitration to be selected later.

Let the Daily Din Deafen

The louder the noise, the greater the impression. So thinks Special Deputy Police Commissioner Barron Collier, who is not satisfied with the daily din at 3 o'clock. He has asked all factories to blow their sirens for one minute beginning at 2.59 as the pupils start home from school. The observance of "Safety Hour" began on May 25. Since that date automobiles have tooted their horns and large buildings have blown their whistles as a safety reminder to both school children and automobile drivers. The din, however, is not deafening enough. Mr. Collier says there are only a few more school days left and that he wants to finish the school year with the least possible number of accidents.

Last year 477 children were killed in the streets and many more were seriously injured. The greater part of these accidents occurred during what is now termed "Safety Hour." Reference to the "Safety Hour" idea and Miss Aunty Walker's activity has been made previously in the ELECTRIC RAILWAY JOURNAL.

Increased Service in Schenectady —Injunctions Against City Made Permanent

The strike situation on the Schenectady Railway remains unchanged, with both the union and the company deadlocked. The trolley company is gradually increasing its service and has been able on one or two nights to maintain service until 10 o'clock. The police have been successful in preventing much disorder, although one or two cars have been stoned. Partial interurban service is being maintained.

Two temporary injunctions obtained by the railway company against the city were made permanent by Supreme Court Justice Edward M. Angell at Fonda. One forbids interference with the operation of cars, while the other restrains the city from enforcing an ordinance requiring operators to have fifteen days' experience under the guidance of experienced operators. Justice Angell held that the city's order holding all cars in the carhouse during the strike was clearly in violation of state railroad laws.

The Schenectady County Board of Supervisors by resolution have called upon the county judge to revoke the revolver permits of all strike breakers. Judge McMullen, when informed of the Supervisors' action, said he would revoke licenses only after specific complaint had been lodged and it had been shown that there was a reasonable cause for revocation.

Discussions Held on Beeler Recommendations for New Orleans

Conferences have been taking place since June 4 in New Orleans over the Beeler organization plan for the traction lines of the city. At the initial conference on June 4 in the Council chamber there were present members of the Commission Council, property holders interested and Major H. R. Copper, representing the Beeler survey bureau. At this meeting the 125 or more changes in the trolley system recommended by the experts were divided into five groups.

The greater part of the time occupied at the conference was taken up by Major Cooper, who had his subject well in hand and pointed out clearly and distinctly the reasons which had prompted the Beeler people to recommend the changes submitted. He said the survey had disclosed that there were two sections of the city that were rapidly developing and to which sufficient and quick street car service would be imperative in the near future. One was the section in the lower part of the city from Lafayette Street to the Industrial Canal and the other in the upper end of the town from Carrollton Avenue to the water filtration plant.

At a later conference he brought out the fact that the city of New Orleans had a tremendous mileage of track and ample equipment to meet its present transportation needs after the elimination of certain lines, the extension of others and the straightening out of others.

In the opinion of Commissioner Paul Maloney, it may be a week or ten days before the Commission Council will be able to take action on the recommendations following the public hearings.

Dismisses Appeals Against New York Railways

An order was entered by the United States Supreme Court on June 11 dismissing for lack of jurisdiction appeals by the Eighth Avenue Railroad and the Ninth Avenue Railroad in suits against Job E. Hedges as receiver of the New York Railways. No written opinion was given in either case. The suits were parallel in nature and were considered as one.

Both companies leased their lines to the New York Railways. When a receiver for the latter was appointed, they filed bills for return of their properties, and several months after the receivership the two properties were returned. The companies then sued for rental during the period the receiver controlled their lines. The District Court declined to order immediate payment of the rents and the complainants asserted that the decree gave no assurance of ultimate payment. The Court of Appeals affirmed the District Court and the two companies appealed to the Supreme Court. In defense, it was pleaded that as both companies are New York corporations, no Federal question was involved. The Supreme Court upheld this plea.

Los Angeles Voters Approve Subway Terminal

The proposed subway terminal franchise was carried by the voters of Los Angeles by a large majority at the city's general election held on June 5. The proposition, which was reviewed in the ELECTRIC RAILWAY JOURNAL, May 26, page 899, was to grant permission to the Pacific Electric Railway to establish under Pershing Square the central station of its $20,000,000 subway system, the first unit of which will be the tubes to give rapid transit service between Los Angeles and the Hollywood district.

At the same election the voters decided in favor of a $2,000,000 bond issue, representing the city's share of the proposed expenditure of $10,000,000 for constructing six new viaducts over the Los Angeles River at Macy, Aliso, First, Fourth, Seventh and Ninth Streets. In addition to bridging the river these viaducts will also cross the numerous steam railroad tracks on each side of the river, thus eliminating the grade crossing hazards and costly traffic and transportation delays at these important industrial district grade crossings. Street car lines are operated over the river on these streets and the delay to street car traffic has been growing greater year by year. The remaining four-fifths of the cost of the new viaduct is to be borne by the street railway companies, the steam railroads and the county of Los Angeles. The work of constructing these viaducts will be commenced shortly, the plans providing for building one at a time to reduce the necessary traffic detours.

The voters also approved of a bond issue of $15,000,000 for improvements at Los Angeles Harbor, which bond issue just equals the amount already authorized and expended for the development of the city's investment on its waterfront. This means the enlargement and construction of more docks, wharves, more dredging and additional switching and storage tracks. The city now owns more than 21 miles of switching and storage tracks serving its municipally owned docks and wharves. More than two-thirds of this circuit is electrified, the switching being performed by the Pacific Electric Railway for the city by means of electric locomotives.

Wage Decision for Scranton Railway Employees Awaited

The arbitration proceedings between the Scranton Railway and Division 168 closed on June 6. The board is composed of James H. Vahey, chief counsel for the Amalgamated Association; Lawrence F. Hart, business agent of Division 168 of the Amalgamated, for the men, and Joseph O'Brien, of the law firm of O'Brien & Kelly, and Ralph W. Rymer, prominent attorney of Scranton, arbitrators for the company, and the fifth arbitrator, or referee, is the Right Rev. Bishop M. J. Hoban of this diocese.

The only issue between the company and the men is one of wages. The company is paying its platform men 50, 55 and 60 cents an hour, and the men contended for 60, 65 and 70 cents, with a corresponding increase for shopmen and trackmen. There was very little oral testimony submitted by the men or the company, all the evidence by the above parties being explained in exhibits. Arguments were made by P. J. Shea, international representative of the union, and James J. Powell, attorney for the men, while Charles P. O'Malley, of the law firm of Knapp, O'Malley, Hill & Harris, made the argument for the company.

The board adjourned until June 23, when it will reconvene, and it is expected that a verdict will be handed down by Bishop Hoban by June 25.

Fares Increased — Increased Wages Sought in Seattle

By a vote of 7 to 2, the Seattle City Council passed over Mayor E. J. Brown's veto the carfare ordinance increasing fares on the Seattle Municipal Railway lines from 5 to 10 cents, with three fare tokens for 25 cents. The increased carfare ordinance becomes effective July 4. Several plans for further increasing street railway revenues are under consideration by the Councilmen, including consideration of the weekly pass system.

Under the present outlook, it is likely that railway trainmen will be compelled to wait for ten days or two weeks before receiving pay due on June 10, when pay warrants amounting to $125,000 became due, but for which there is no balance to the credit of the railway. The Seattle banks, through the Bank Clearing House Association, have refused to cash the street railway warrants.

To complicate the situation further, a general demand for increase in wages has been made by all shopmen, linemen and laborers of the Municipal Railway, and by the conductors, motormen, one-man car operators and cable car employees. The increased wage is asked to become effective Jan. 1, 1924, and is asked at this time to permit of its being included in the railway budget.

Under the schedule demanded, conductors and motormen would receive a minimum of $180 a month instead of the present scale of $135 for the first year, $145 for the second year, $150 for the third year, and $155 thereafter. One-man car operators are asking for 20 cents an hour over the scale for other platform men, which would bring their wages to $228 for a thirty-day month. They are now receiving $164.60. There are 1,450 platform men employed. Shopmen, numbering about 200 at present, are asking for increases ranging from 50 cents to $1 a day and track workers are asking for an increase of approximately 25 per cent. If such increases and others sought were granted it would mean that $650,000 annually would be added to the street railway payroll.

Large Improvements in Richmond Planned

Elaborate improvements to the service of the Virginia Railway & Power Company in Richmond are planned under the new franchise which now is before the City Council, according to a map which has just been drawn up by the company for the information of the Councilmen. The map shows a number of new street car lines in every section of the city, proposed under the new franchise, a number of extensions of existing lines, and the removal of a great deal of track conflicting with lines now in successful operation.

One of the provisions includes important changes in the heart of the city. They include the construction of a block of track on Grace Street between Seventh and Eighth Streets, and of track on three sides of a block between Marshall and Clay Streets. The first move would allow the company another loop in the downtown district, as it has tracks on Broad, one block north, and on Seventh and Eighth Streets at the present time. The second provision would give the Highland Park line a terminus two blocks away from the present congested district at Seventh and Broad Streets. The cars now must stand at this point until trolleys can be changed and the only cars available are those which can be operated from both ends.

This program would call for a huge expenditure of funds and would eliminate a great deal of trackage not essential, adding a great deal of much needed trackage. Councilmen are much pleased with the proposed improvements, and are believed to be in favor of the proposal.

Double Tracking Arranged Without Any Paving Obligation

The Common Council of Beloit, Wis., has confirmed an agreement with the Beloit Traction Company and the Rockford & Interurban Railway, joint users of the track, calling for the construction of a double track on South State Street. The city will not require either of the companies to pay any part of the repaving of the street, which is to be done simultaneously with the laying of the new tracks.

The Rockford & Interurban Railway holds a franchise giving it the right to maintain a single track in the center of the street, such as is now in use. From the point of view of that company this track is ample for its needs. The city, however, needs the double track. To obtain it the three-cornered agreement was worked out. The interurban company assumes the expense of moving its track to one side in exchange for the city's waiving the cost of paving between the rails as called for in the franchises. The Beloit Traction Company agrees to lay the second track as part of its future loop around Broad and Pleasant Streets. The city bears the expense of paving between the rails of this track.

Strike Averted in Chicago—Arbitration Will Decide Wage Issue

There will be no strike in Chicago. The wage controversy will be settled by arbitration.

The agreement to submit the wage dispute in Chicago to arbitration came on June 12 after a series of conferences between officials of the companies and representatives of the unions held in the office of Mayor Dever in the City Hall. Shortly after 1 o'clock on that day it was unanimously agreed that there should be no strike and that the wage dispute be submitted to a board of arbitration. The wage scale fixed will be for two years, from June 1.

Mayor Dever, who was successful in his negotiations to bring about arbitration without a tie-up of the city's elevated and surface lines, will appoint the umpire, or third member of the arbitration board. The Mayor suggested that he would prefer to name all three members of the arbitration board, but the union representatives refused to consider this proposal. Members of the board will be selected in a few days.

The only question to be considered by the board of arbitration will be that of the 10 cents an hour increase demanded by the men. Officials of the company insisted that the whole question of working conditions should be opened in the event an arbitration board passed upon the merits of the controversy. The union representatives, led by William D. Mahon, international president, who came from Detroit to be present at the negotiations, agreed to leave the question of the wage increase to arbitration, but refused to permit the question of working conditions to be considered.

The union officials will not go back to their locals for approval of the arbitration plan, as the unions in their resolution adopted last week voted authority to the leaders to negotiate "any reasonable settlement."

Farewell Dinner by Englishmen

Messrs. J. C. Mitchell, Ivor Frazer, Albert Rozier and E. Boyes, the four Englishmen connected with the London railway and bus operations, who have been studying transportation conditions and methods in the United States during the past six weeks, on June 11 gave a farewell dinner at the Lotus Club, New York City, for a few of their acquaintances within easy reach. They sailed on the Aquitania June 12. During their stay in this country they visited New York, Albany, Montreal, Toronto, Buffalo, Cleveland, Detroit, Chicago, Pittsburgh, Washington, Philadelphia, Atlantic City and Boston.

The four men were exceedingly enthusiastic over the cordiality and hospitality they had been extended everywhere. They praised our railway people in highest terms, not only for the reception they had been given, but for the manner in which everything in the way of information had been opened up to them. They said that they now saw traction matters in an entirely new light. They were reluctant to express any views of their impressions of American railway work until they had had time to think over all of the things they had seen and heard. As Mr. Frazer, who is responsible for the famous London underground posters, put it, his mind was a "mass of mental pulp," because of all the things he had tried to absorb from American practice.

In other informal talks made at the dinner there were many complimentary references to the work of the English railways and to the success attained by Lord Ashfield. Frank Hedley, who lived in England the first nineteen years of his life, said he had attended the dinner to Albert H. Stanley, now Lord Ashfield, when the latter went to London to manage the railways, and he said that knowing the British people, he knew that the promotion and elevation of Mr. Stanley was because he had "made good."

The guests at the dinner were: N. A. Bolen, E. F. Gaynor, E. C. Faber, R. H. Montgomery, Fred H. Gallagher, H. H. Vreeland, John L. O'Toole, W. C. Burton, Frank Hedley, B. A. Hegeman, H. C. Clarke, F. O. Wood, Fred Sargent, C. E. Morgan, Charles Castle, H. C. Donnecker, C. P. Norcross, M. R. Boylan, H. A. Hegeman and H. L. Brown.

News Notes

Increase in Wages of Five Cents.—Trainmen employed by the Lake Shore Electric Railway Company, Cleveland, will receive an increase in pay of 5 cents an hour. This will bring their wages to a maximum of 55 cents an hour for the fifth year of service. The trainmen on this line now start for 50 cents an hour and get 1 cent an hour increase for each year of service

Line to Be Rehabilitated.—The Arkansas City-Winfield Northern Railway, Wichita Kan., will be rehabilitated and shortly put into first-class shape. The property, formerly known as the Southwestern Interurban Railway, was purchased early in 1923 by a group of Wichita capitalists. The line consists of 15 miles of interurban and 5 miles of city lines in Winfield and Arkansas City, Kan. The president of the company is George Theis, Jr., who is president of the Arkansas Valley Interurban Railway.

City Club Behind Railway Program.—The City Club of Atlanta, Ga., has joined with numerous citizens in expressing the hope that the Georgia Railway & Power Company "will receive every reasonable opportunity and encouragement in the development of its service, which means so much to the present and future of the city." It has adopted resolutions embodying these sentiments. The improvement program of the company was reviewed previously in the ELECTRIC RAILWAY JOURNAL.

Foreign News

Freedom from Accidents

The number of drivers who have entered for the drivers' freedom from accident competition for 1923 of the London Safety First Council is no fewer than 10,908, or about 50 per cent more than last year. The competition is open to drivers of all classes of road vehicles, including tramcars and buses. Each competitor free from accidents during the year receives a prize in money, or a badge, medallion or diploma.

Difficulties of Tramway Extension in London

At a recent meeting of the London County Council, C. W. Matthews, chairman of the highways committee, referred to the proposals for the extension of the London Underground Railways. These railway companies, he pointed out, were in a different position from the Council. They were able to secure without difficulty full consideration by the committees of Parliament of any proposals for extensions which they might bring forward. But the Council could not introduce a bill into Parliament for tramway extensions unless it first obtained the consent of the local road authorities. That was provided by Parliamentary standing orders, and Parliament had consistently refused to relax these orders. The highways committee had for some time been in communication with the local road authorities concerned with regard to the possibility of seeking powers for the construction of certain new tramways. When they knew to what extent the authorities affected would be prepared to give the necessary consent, they might proceed with a Parliamentary bill.

London Tramway Finance

Although the traffic receipts of the London County Council tramways, like those of a good many others in England, continue to show a decrease, it was mentioned at a recent meeting of the Council that the accounts for the past fiscal year would show a surplus. This can only arise from a reduction in expenditure. The cost of materials has, of course, fallen and wages continue to come down. Early in May another 1s. per week came off wages under the sliding scale arrangement, which will mean a saving on the London undertaking of £31,000 a year. The official index figure of the cost of living at May 1 was 70 per cent above that of July, 1914, as compared with 74 per cent on April 1. As the index figure falls, so do wages. It may be recalled that the deficiency on the working of the London County Council tramways for the year 1920-21 was £590,000 and for the year 1921-22 it was £88,000.

Financial and Corporate

$1,917,044 Net in Atlanta

Georgia Railway & Power Company Reports This Amount for 1922 Before Depreciation and Dividends

After payment of operating expenses, taxes, rentals and interest, the balance of the year's operations of the Georgia Railway & Power Company, Atlanta, Ga., for 1922 amounted to $1,917,044, and after the payment of sinking funds to $1,666,253. Reserves for maintenance, damages and contingencies are charged to operating expenses. In 1921 the actual expenditure on these accounts was $9,556 less than the amount charged in operating expenses and credited to reserves. In 1922 the expenditure on these accounts was $364,066 less than the amount charged in operating expenses and credited to reserves. It is thus explained that in order to make a true comparison on the basis of actual expenditures for operations between the "net income" of 1921 and the "net income" of 1922 there should be added to "net income" for the year 1922 the sum of $354,510.

Pursuant to the provisions of the general mortgage of Georgia Railway & Power Company dated Nov. 1, 1921, and to an order of the Railroad Commission of Georgia dated June 7, 1922, the company issued during the year $3,500,000 of twenty-five year 6 per cent general mortgage gold bonds, series of 1922, secured by a general mortgage on the property, subject to the first and refunding mortgage dated April 1, 1914, and the mortgage of the Atlanta Water & Electric Power Company, and also secured by a deposit with the trustee of $3,500,000 par value first and refunding mortgage 5 per cent bonds, which latter, owing to the low interest rate, were unsalable under current market conditions at a price the company could afford to take. Inasmuch as bonds can only be issued under the general mortgage to the extent that first and refunding mortgage bonds are deposited with the trustee of the general mortgage as collateral, the issuance and sale of this $3,500,000 general mortgage gold bonds, series of 1922, did not increase the bonded debt of the company.

Of this issue of $3,500,000 of general mortgage gold bonds $631,700 of the proceeds were used in paying off the balance due on account of the purchase price of the Tugalo power plant equipment and machinery. The balance of proceeds, namely, $2,553,300, was deposited with the trustee to be used exclusively for the purpose of completing the Tugalo Development, increasing the capacity of the Morgan Falls plant, and other items of new construction necessary for the transmission, distribution and delivery of electrical energy, all as authorized by the Public Service Commission of Georgia.

The company issued during the year $2,500,000 first preferred 8 per cent cumulative stock, series of 1922. The sum of $2,000,000 par value of this new stock was used in retiring the $2,000,000 first preferred 6 per cent cumulative stock of the company together with the accrued and unpaid dividends thereon aggregating $30.50 per share. The remainder of $500,000 par value of the new first preferred 8 per cent cumulative stock, series of 1922, was sold for cash at par, and the proceeds placed in the treasury of the company to be used or applied only for the acquisition or construction of new and additional property, or reimbursing the company for expenditures already made for new construction.

GEORGIA RAILWAY & POWER COMPANY AND LEASED AND SUBSIDIARY COMPANIES

Income Statement

	1921		1922	
Operating revenues	$14,080,903		$14,449,497	
Operating expenses	8,476,795		9,130,345	
Net operating revenue		$5,604,108		$5,319,152
Less taxes		916,765		952,188
		$4,687,343		$4,366,964
Other income		350,921		417,190
Gross income		$5,038,264		$4,784,154
Bond interest and rental dividends of leased and subsidiary companies		1,679,228		1,694,311
		$3,359,036		$3,089,843
Other interest of leased and subsidiary companies	$158,126		$185,869	
Extinguishment of discount on securities of leased and subsidiary companies	9,287	$167,413	9,661	195,530
		$3,191,623		$2,894,313
Bond interest Georgia Railway & Power Company		655,017		888,350
		$2,536,606		$2,005,963
Interest on notes Georgia Railway & Power Company	$221,239		$26,744	
Extinguishment of discount on securities Georgia Railway & Power Company	88,903	310,142	62,175	88,919
Net income for the year before depreciation and dividends		$2,226,464		$1,917,044

NOTE: As stated in the text of the report $354,510 must be added to the "Net Income" for 1922, as shown above, to make a true comparison with 1921, resulting in "Net Income" for 1922 on the basis of actual expenditures for operations of $2,271,553 compared to $2,226,464 for 1921.

Under the terms of sinking fund provisions of the respective mortgages, the total sinking fund requirements for the year were $253,042.

On Dec. 31, 1922, the total mileage of railroad tracks (on a single-track basis) owned or leased and controlled and operated by this company, including the mileage in Gainesville, Ga., was 247.303.

During the year 1922 the company placed an order for twenty city-type electric railway double-end pre-payment passenger cars with a seating capacity of forty-eight passengers each at an aggregate cost of $256,000. These cars have all been delivered and are now in service.

During 1922 the company transported 94,208,490 passengers, as against 93,557,131 in 1921.

Alabama Company Revalued at $29,000,000

The valuation of the Alabama Power Company properties was recently fixed by the Public Service Commission for rate-making purposes at $29,000,000. This order supersedes the order issued by a majority of the commission on Dec. 13, 1922, which fixed the valuation at $33,843,252. The order of last December never became effective, having been suspended pending application by the Alabama Mining Institute for a rehearing.

The revaluation places the properties at $4,943,252 less than the original valuation as made by Associate Commissioners Cooper and Gaillard before leaving office. In reaching the new valuation the commission considered the evidence submitted in the original hearing and made new investigations into the various phases of the case.

The new valuation, which covers all property of the company as of June 30, 1920, plus property acquired since that time, including the utilities of Montgomery, is $15,000,000 less than the final valuation placed by Hagenah & Erickson, engineers, who made an inventory and appraisal of the property for the commission after the valuation case was docketed in 1920. Their original report placed the valuation at approximately $47,000,000. Later, conferences between them and I. F. McDonnell, engineer for the commission, caused a reduction of the valuation to approximately $44,000,444. A check was then made by Mr. McDonnell of the valuation recommended by Hagenah & Erickson and of the valuation of Morris Knowles, who was employed by large consumers of power, and his recommendation was the establishment of the $29,000,000 valuation. The order states that the above valuation included the sum of $1,500,000 working capital and $3,750,000 as going concern value.

Before the valuation can become final sixty days must elapse for protest. Upon the expiration of sixty days, unless protest is filed, the valuation fixed becomes final. Governor William W. Brandon stated the valuation arrived at had his full approval and was in line with his own ideas as to the fair value.

Receivership Ends

Brooklyn-Manhattan Transit Corporation Starts Operation—Menden Heads New Company

The receivership of the Brooklyn Rapid Transit Company, with the exception of certain formalities affecting the surface lines, was terminated on June 14, when Judge Mayer of the Federal District Court ordered turning over the properties to the newly organized Brooklyn-Manhattan Transit Corporation. The new company began operation at midnight, but the receiver will operate the surface lines for a few days.

The officers of the new company are: Gerhard M. Dahl, chairman of the executive committee; Albert H. Wiggin, chairman of the finance committee; William S. Menden, president; George D. Yeomans, vice-president and general counsel; Howard Abel, comptroller. The offices of secretary and treasurer have not as yet been filled. J. H. Bennington, who has been in charge of the department of real estate and taxes under the receiver, will be continued in the same capacity with the new company.

The board of directors includes three members named by the Transit Commission to represent the public. This is in accordance with the reorganization plan. These men are: Travis H. Whitney, former Public Service Commissioner; Alfred E. Marling, former president Chamber of Commerce, New York, and Robert A. Shaw, formerly chairman transit committee, Brooklyn Chamber of Commerce. The other directors are: Arthur S. Somers, president Brooklyn Chamber of Commerce; Charles A. Boody, president People's Trust Company; J. Sherlock Davis, president Cross, Austin & Ireland and former president Brooklyn Chamber of Commerce; James H. Post of B. H. Howell Sons & Company; William H. Johns, president George Batten Company and former president of Queens Chamber of Commerce; William H. English, director Brooklyn Trust Company; William S. Menden, president Brooklyn-Manhattan Transit Corporation; Albert H. Wiggin, president Chase National Bank; Frederick Strauss of J. & W. Seligman & Company; Matthew C. Brush, president American International Corporation; Charles S. Sargent, Jr., of Kidder, Peabody & Company; Gerhard M. Dahl, of Hayden, Stone & Company and George S. Franklin of Cotton & Franklin.

Prior to Judge Mayer's action dissolving the receivership, Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, presented his final report on the transactions of the receivership. Mr. Garrison took occasion to thank the court for its splendid co-operation, which was reflected in the comparatively short time within which the intricate matter was brought to a conclusion. Further, that only those matters which absolutely necessitated it were brought before a master and so the seven receiverships involved had only incurred a relatively small expense for master's fees. He also thanked the able counsel and then acknowledged the help which General Manager William S. Menden and heads of the different departments gave to the work.

The salient facts brought out in the report included the following:

Approximately $26,000,000 has been spent on the rapid transit lines for new construction and the purchase of equipment.

Approximately $1,600,000 has been expended on the surface lines for track reconstruction, car reconstruction and new cars.

The Brooklyn Rapid Transit receiver has spent out of earnings upward of $3,700,000 on the construction of the Williamsburg power plant.

Power bills in arrears owing by the surface companies in receivership in the total amount of $1,710,799 have been paid.

Taxes in arrears in the amount of upward of $3,000,000, as of Nov. 30, 1920, have been paid and all current taxes levied have been paid, except for contested items.

4.40 miles of company owned rapid transit lines under construction at the beginning of the receivership have been completed and placed in operation. 30.095 miles of city owned trackage has been completed during the receivership and the company has equipped and placed the same in operation. Arrangement has also recently been made for joint operation over 12.20 miles of track on the Corona and Astoria elevated extensions in Queens, and this operation has been commenced.

The total number of revenue passengers carried by the rapid transit lines has shown a constant and substantial increase as shown by the following yearly totals: 1918, 280,295,281; 1919, 330,256,192; 1920, 393,778,883; 1921, 431,108,837; 1922, 459,049,609.

The total number of revenue passengers carried on the surface lines (including the Brooklyn City Railroad) has likewise shown a substantial increase as shown by the following yearly totals: 1918, 320,370,317; 1919, 398,199,316; 1920, 402,647,343; 1921, 449,795,980; 1922, 465,865,137.

The receivership surface lines purchased ninety-two new safety cars and forty-six new trail cars during the receivership.

150 old type surface cars have been reconstructed into cars of the safety type so they can be operated by one man.

During the year 1922 approximately 17 miles of surface trackage of the receivership lines was reconstructed at a cost of $650,000, and approximately an equal amount of reconstruction work is under way during the present year.

400 new cars for the rapid transit lines have been purchased and placed in operation during the receivership at an approximate cost of $10,000,000.

Increase in Service. In 1919, 140,000 car-miles were operated on the rapid transit lines daily. At the present time approximately 200,000 car-miles are operated daily, an increased service of approximately 43 per cent during receivership. If seat-miles are taken, it shows a still greater increase of service. The total number of seat-miles for 1918 was 2,945,480,124, as compared in 1922 with 4,528,515,520, approximately a 50 per cent increase in the number of seats furnished for passengers to ride 1 mile.

The increased service furnished by the system has been made possible largely through improved operating methods and labor-saving economies and without any marked increase in the number of employees.

At the outset of the receivership, there were 4,532 suits and claims against the companies for tort damage, with respect to which 3,106 claims were filed with the receiver for an aggregate amount claimed of $21,013,328. Of these claims 2,950 have been liquidated either by trial or by agreement for a total liability of $2,030,775. Only 124 remain undisposed of, for an estimated liability of $65,295.

A total of 1,034 claims for money due upon contract, prior to receivership, were filed with the receiver for an aggregate amount claimed of $6,184,822. With the exception of fifty-nine claims, all of these have been satisfactorily disposed of by litigation or by agreement.

Net Income $451,000

The Springfield, Mass., Street Railway's annual report shows operating revenue of $3,409,436 in 1922, as against $3,428,334 in 1921; operating expenses of $2,685,586 in 1922, as against $2,957,404 in 1921. The decrease in the first instance was $18,898, and the decrease in the second instance was $271,818. After payment of taxes and interest on funded and unfunded debt, the net income was $451,000, out of which a 5 per cent dividend was paid, against a net income of $264,766 in 1921.

During 1922, the report shows $169,000 was spent on additions and renewals in the roadway, tracks, structures and car equipment. The amount spent for track and maintenance is shown to be $26,000 more in 1922 than in 1921. The number of passengers carried in 1922 was 49,544,902, an increase of 208,980 over 1921. Car-miles operated in 1922 totaled 6,939,524, a decrease of 88,168 from 1921.

The fact that operating revenue was less, although the number of passengers was greater in 1922 than in 1921, is explained on the ground that a greater number rode on special rate tickets in 1922.

$2,261,340 Increase in Toledo Tax Protested

The State Tax Commission has raised the valuation of the properties of the Community Traction Company, Toledo, to $7,252,940, or $2,261,340 more than last year. This is an increase of 45.8 per cent in one year and brings the total up to 94.25 per cent of the valuation as fixed under the franchise ordinance.

The car riders are now paying a tax equivalent to 0.36 cent per fare. If the increase stands it will boost it to approximately a half cent per fare.

The sinking fund presents another tax problem. Money in the fund is really the property of the city as it goes to retire bonds, after which equivalent common stock is issued in the name of the city. The company has no control over the funds. However, they are taxed as company funds. The cash in the fund is taxed in Ohio as an operating fund, then the bonds to be retired are taxed, and under the New York laws the money actually in the hands of the trustee is taxed by that state. Cash in the fund is taxed three times and bonds retired and property owned by the city are taxed once. There are now $364,000 of the bonds retired and equal amount of common stock issued to the city and $120,761 in cash in the fund on May 1. The state tax commission has refused to make any concession on this item.

The boost in valuation is believed to be a discrimination against utilities. All property in the state is by law supposed to be taxed "according to its true value in money and at a uniform rate." However, real estate in Toledo is assessed at about 60 per cent of its full value. Other counties vary from this ratio. To tax a public utility on an assessed valuation of 95 per cent and other property only 60 or 75 per cent is discrimination in the view of the street railway board and commissioner.

Commissioner Cann and Assistant City Law Director Dodd appeared before the State Tax Commission recently to protest the valuation.

Report on Traction Fund

Chicago Fund Totaled $28,438,295 on Jan. 1—May Accept the Payments Refused by Mayor Thompson

The status of the city of Chicago's traction fund, accumulated by the collection of 55 per cent of the net earnings of the Chicago Surface Lines by the municipality under the terms of the 1907 ordinance, is outlined in a recent report by City Comptroller Martin J. O'Brien. This fund was created to be used ultimately for subway construction.

The report shows that the traction fund totaled $28,438,295 on Jan. 1, 1923, and that payments aggregating $8,189,128 had been offered to the city by the companies during the last four years of Mayor Thompson's administration, but were refused by Former Mayor Thompson on the theory that these would impair his efforts to have the companies' franchises declared void by the courts. By this refusal it is estimated that the city sacrificed $640,000 in interest.

Comptroller O'Brien's report shows that the Chicago City Railway paid $8,745,716 into the traction fund, while the Chicago Railways paid $13,665,812. The total deposits are $22,411,528, while $6,772,163 in interest has been earned on the fund. Expenses of investigations of the local transportation problem, reports on subway plans and litigation over fares used up $745,396 of the fund. Of this amount $600,683 was spent by the Thompson administration, chiefly in connection with litigation.

Mayor Dever now has under consideration the question of acceptance of the payments refused by former Mayor Thompson. If these are accepted, the city's fund will total $36,627,424.

The traction fund is now a part of the city's consolidated investment fund. Interest earnings last year totaled $1,000,000. The report shows that the fund is distributed as follows at present:

Cash	$11,788,779
Invested in anticipation tax warrants	34,155,000
Invested in city of Chicago bonds	3,063,000
Invested in U. S. Liberty bonds	8,860,800

Detailed information regarding the fund will be found in the accompanying table.

Dividends Declared.—The directors of the Twin City Rapid Transit Company, Minneapolis, Minn., have declared a semi-annual dividend of 3 per cent on the common stock, payable July 2, to holders of record on June 15. Semi-annual dividends of 2 per cent were paid on the common stock on July 1 and Dec. 30, 1922.

Issue Authorized.—The Board of Public Utility Commissioners of New Jersey has authorized the Cumberland Traction Company, Bridgeton, N. J., to issue $24,800 in preferred stock and $17,200 in common stock. The proceeds of these issues will be used for the acquisition of certain property formerly owned by the Bridgeton & Millville Traction Company.

Auction Sales in New York.—At the public auction rooms in New York on June 13 the following electric railway securities were sold: $4,000 Second Avenue Railroad first consolidated 5 per cent bonds, due 1948, certificates of deposit, $36 lot; $84,000 Washington-Virginia Railway 6 per cent secured gold notes, series A, due Jan. 1, 1922, January, 1922, coupon attached, $85 lot.

Sale Date Announced. — Albert Swartz, Harry A. Dunn and Joseph A. Yager, special masters, will sell at public auction to the highest bidder on June 19, 1923, the property of the Toledo & Western Railroad. The sale will take place at the railroad station of the property in the village of Sylvania, Ohio. The sale will be carried out in pursuance of the provisions of a decree entered in the District Court of the United States for the Northern District of Ohio, in Toledo, on May 7, 1923.

Gold Bonds Being Offered.—Baker, Young & Company, Blodget & Company and Arthur Perry & Company are offering at 98½ and interest to net about 6.15 per cent $3,000,000 of first mortgage 6 per cent gold bonds of the Dubuque Electric Company. The bonds are dated April 2, 1923, and are due April 1, 1942. The purpose of the issue will be to discharge all present funded debt and for other corporate purposes. The company has at present outstanding $2,445,000 first mortgage 5 per cent bonds due June 1, 1925, and $111,000 8 per cent notes due Sept. 1, 1923.

Taylor, Engineer, on Norfolk Valuation. — In the issue of the ELECTRIC RAILWAY JOURNAL for May 28, page 902, Edwin Wortham was credited as being author of a valuation report of the Norfolk Street Railway property of the Virginia Railway & Power Company. This information was received from a correspondent whose work is dependable. In this instance the information given him seems to have been incorrect. Credit for preparation of the report should have been given to Walter H. Taylor, 3d, City Engineer of Norfolk, while Mr. Wortham acted as assistant.

Sale Decreed by Court.—All the tangible assets, charters, leases and rights of the Portsmouth, Dover & York Street Railway, Portsmouth, N. H., which ceased operation several weeks ago, will be sold at Alfred on June 30. The sale was decreed by Judge Clarence Hale in the United States District Court. Philip G. Clifford has been appointed special master. For the past six years the property has been operated by Willis G. Meloon, as receiver. Recent efforts to reorganize and rehabilitate the road failed and nothing was left but to petition the court to terminate the affairs of the company.

Enters Order for Sale.—Judge Evan Evans of the United States Circuit Court, sitting in Chicago, has entered an order for the sale of the Aurora, Elgin & Chicago Railroad properties, consisting of the Aurora and Elgin city lines and interurban lines operating in the Fox River valley. The order was issued on application of holders of $1,546,000 bonds of the Elgin, Aurora & Southern Traction Company, from which the Aurora, Elgin & Chicago company developed. Holders of the bonds are three Cleveland banks. The sale, it is expected, will result in a refinancing of the lines, which have just been voted new twenty-year franchises in Aurora and Elgin.

Must Pay to Manhattan Stockholders.—Frank Hedley, president Interborough Rapid Transit Company, recently announced that the Interborough board had determined that the net earnings applicable to the Manhattan rental for the quarter ending June 30, 1923, amounted to 60 cents a share and the rental was ordered paid to Manhattan stockholders at that rate on July 1, 1923. The Interborough failed to earn the full 3 per cent for Manhattan rental as reduced from 7 per cent by approximately $90,000 for the year, hence the payment of 60 cents a share instead of 75 cents which would be the amount payable at 3 per cent if earned. The deficit, however, Mr. Hedley said was cumulative and would have to be paid in the future if and when earned.

STATUS OF CHICAGO'S TRACTION FUND

Year	Deposits of Chicago City Railway Paid on April 10	Deposits of Chicago Railways of each year	Total Deposits	Interest Earnings	Expenses Paid
1908	$675,702	$881,106	$1,556,809	$30,054	.....
1909	521,666	862,782	1,384,449	53,361	.....
1910	473,942	811,320	1,285,262	79,747	.....
1911	960,075	744,110	1,704,185	99,542	24,462
1912	1,048,361	821,376	1,869,738	133,415	66,201
1913	1,116,163	1,412,870	2,529,033	292,103	51,418
1914	842,587	1,855,205	2,697,792	293,866	2,450
1915	872,845	1,684,197	2,557,042	479,809	.....
1916	547,680	1,116,744	1,664,424	397,234	203,882
1917	976,995	1,768,659	2,745,654	434,220	76,820
1918	704,411	1,330,940	2,035,352	765,681	14,764
1919	5,284	376,498	381,782	837,444	22,331
1920	.....	.....	.....	891,827	181,221
1921	.....	.....	.....	983,847	43,872
1922	.....	.....	.....	1,000,005	57,790
	$8,745,716	$13,665,812	$22,411,528	$6,772,162	$745,396
Total fund balance as of Jan. 1, 1923					$28,438,295
These amounts tendered and not accepted:					
1920	$442,990	$1,004,362	$1,447,352	.....	.....
1921	737,989	1,406,626	2,144,616	.....	.....
1922	1,075,744	1,858,367	2,934,112	.....	.....
1923	552,654	1,110,392	1,663,046	.....	.....
Total unaccepted			8,189,12		

Traffic and Transportation

Eight-Cent Fare in Jersey

Judge Haight Reports on Controversy Between the Railway and Commissioners—Will Appeal

Another chapter in a fight lasting almost five years was terminated on June 9 when former Judge Thomas G. Haight, as special master, affirmed the 8-cent fare with 1 cent for transfers on the lines of the Public Service Railway, Newark, N. J. Judge Haight also recommended that the fare be authoritatively declared effective. Since the fall of 1921 this has been the rate charged by the company in various parts of the state, although it has been opposed by the Board of Public Utility Commissioners. The fight of the Jersey City Commission will be carried to the Supreme Court of the United States following a resolution offered by Frank Hague, Mayor, and adopted by the commission on June 12.

First Application for Increase in 1918

The controversy between the Public Service Railway and its subsidiary traction companies on the one side and the Board of Public Utility Commissioners with several New Jersey cities on the other side dates back to 1918, when the company, owing to the increased costs of operation, brought about by war conditions, applied to the commission for permission to charge 1 cent for transfers in addition to the 5-cent fare then in effect. This was approved, as was a second application, a year later, for further increases to a 7-cent fare and a 2-cent transfer charge.

On July 15, 1921, the commission denied a third request for an increase by the company to a 10-cent fare without charge for transfers. The commission held that the increase was not justified by the costs of operation and decreed that the "seven-two" rate be continued.

The company appealed to the Federal Court, alleging that the continuance of the 7-cent fare with a 2-cent transfer rate was confiscatory and invaded its property rights, and sought to obtain an injunction to restrain the commission from preventing it from putting its proposed 10-cent fare into effect. The commission was restrained temporarily by the court, on condition that the company would charge a fare not exceeding 8 cents and 1 cent for initial transfers. The appointment of Judge Haight as special master followed.

Differences Over Valuation

The chief point of difference in the testimony before Judge Haight was on the question of the valuation of the company's properties. The commission had fixed it at approximately $82,000,000, while the company contended that the true value was in the neighborhood of $200,000,000.

Experts testifying for both sides estimated the value of the property at from $65,000,000 to $135,000,000. In his report Judge Haight fixed about $110,000,000 as a fair valuation of the company's holding. He based this upon an estimate of the cost of reproduction, new, at present prices, less depreciation of $98,291,563 for the company's physical property, $8,000,000 for the power lease or contract and $5,500,000 for going value, or a total of $111,791,563.

In his report Judge Haight said:

> As I have found that the rate of fare fixed by the Board of Public Utility Commissioners is confiscatory, I am constrained, of course, to recommend that a decree be entered restraining the board from putting it into effect or from enforcing or attempting to enforce the orders or the rate. If the effect of such a decree will be, as suggested in Judge Woolley's opinion, to re-establish a prior and lower rate of fare, then, of course, the decree should also prevent the putting into effect or enforcement of any such lower rate.
>
> The plaintiff has also prayed in its bill of complaint for an injunction restraining the board from preventing the plaintiff from putting into effect and collecting a rate of fare of 10 cents for adult passengers, without charge for transfers. I do not think that the court should attempt to pass on that question, or attempt to decide what rate of fare in excess of that prescribed by the before-mentioned orders of the board would produce the necessary fair return, for to do so would be in effect to indulge in rate-making.
>
> If it is eventually determined by this court or the Supreme Court, on appeal, that the rate fixed by the Board of Public Utility Commissioners is confiscatory, it will be necessary for the board to prescribe a new rate of fare. It is, of course, not to be doubted that the board will fix a proper rate of fare based upon the valuation and rate of return which this court or the Supreme Court, on appeal, may eventually determine is proper in order to avoid confiscation.

Copies of the report were forwarded to Trenton to the three Federal judges comprising the special tribunal selected to adjudicate the fight and who appointed Judge Haight to take testimony.

New Employees in Dallas Will Have Trained Instructors

According to new plans being worked out by the employment and training department of the Dallas Railway, instructors in that department will take a standardized course in methods of teaching new employees. Supervision over this department has been given to C. J. Crampton, superintendent of the efficiency department. Mr. Crampton will be assisted by Inspector A. E. Harris, who has been loop inspector. Mr. Harris will retain his rank and title as inspector and assume the duties of chief instructor for the present.

Several students are now taking the course and it is likely that no new men will be employed by the railway for some time to come. Just at present there is a large number of applicants for employment, and due to this condition the employment department advises that men be not encouraged to seek employment.

Seven Cents in Norfolk

Corporation Commission Fixes Higher Fare Temporarily—Jitney Competition Figures Largely in Order

Without deciding the value of the property of the Virginia Railway & Power Company in the city of Norfolk, South Norfolk and Norfolk County, the Virginia State Corporation Commission has issued an order increasing the fare on the company's Norfolk division from 6 to 7 cents, four tokens for a quarter. Major Alexander Forward, the commissioner in charge of public utility work, increased the fare on noting that under either the valuation claimed by the city of Norfolk, or that claimed by the company, a higher fare was justifiable.

The valuation claimed by the company is about $10,500,000, while the city's approximate value is $6,150,000. In Norfolk it is generally believed that the decision of the Corporation Commission may mean an even higher fare, as the token fare would be only about 6¾ cents a passenger.

In the 7-cent fare order the testimony of the Virginia Railway & Power Company is cited that jitneys handled 25 per cent of the traffic in Norfolk and at Richmond only 10 per cent. Attention was also called to the admission of Walter H. Taylor, director of public works, chief witness for the city at the hearings, that there were some jitney lines in Norfolk in unfair competition with the cars of the traction company. Further, that jitney owners were not required to contribute to street paving, that the buses operated only in well settled sections and that they were permitted to charge a fare higher than on the street cars:

An important part of the order concerned the 3 per cent depreciation reserve set aside by the company from its earnings. However, the commission purposely withheld opinion as to the methods used in calculating depreciation, but said "it is certain that any adjustment thereof that might be made would not involve a sufficient amount in the Norfolk street railway system to result in bringing the return up to a fair amount even on the basis of valuation presented by the city.

The matter of the Norfolk fare has been under discussion for some time. Some facts about the situation were recently brought out in a letter to the editor of the *Ledger-Dispatch* entitled "Street Car Fares," by T. Norman Jones, Jr., general manager of the Norfolk division. His letter takes the form of a reply to some comment in the paper on the comparative cost of bus and electric car operation, which said, among other things: "Gradually the street railway fares have been increasing and now the Virginia Railway & Power Company wants in Norfolk a fare that is equal to that of the motor-bus lines."

Mr. Jones referred to the jitney competition which the city had permitted to grow and said that financial results would be very different if jitneys were taken out of territory which for the

most part had been developed by his company and were confined to territory which the company did not serve. His analysis of the situation brought out the following:

The longest haul on a motor bus line in Norfolk for one fare (no transfer privilege) is approximately 4.3 miles.

The longest haul on street cars in Norfolk for one fare without transfers is approximately 5.5 miles. The longest haul, including the use of a free transfer, is approximately 9.5 miles.

The average of the one-way distances traversed by jitney routes in Norfolk, exclusive of the second zone on the Naval Base jitney line, is approximately 3.3 miles.

The average of one-zone fare routes on street cars in Norfolk, exclusive of second and third zones, which do not transfer to each other, and exclusive of the shuttle line in Berkley, carrying with it second transfer privilege, is 4.05 miles, without transfers. With transfer privilege a person can travel varying distances up to a maximum of 9.48 miles for one fare.

The average fare collected on the street cars, exclusive of free transportation for company employees and policemen and firemen in the city service, but including free transfer passengers for three months, Jan. 1 to March 31, 1923, is .0513 cent.

The Corporation Commission of Virginia, under the new statutes and recently compiled Code of Virginia, is placed in charge of all electric street railway systems in the state whose franchises have been granted since the code was compiled. Realizing that the Corporation Commission has become the rate-making body of the state, Norfolk has twice petitioned that body to set the fare in Norfolk.

The city attorney has been asked to render the Council an opinion on the power of the Council as a rate-making body should a blanket franchise be granted and no action will be taken on the company's petition until this opinion is in hand.

Eastern Massachusetts Wants to Operate Buses in and Out of Woburn

The Eastern Massachusetts Street Railway, Boston, Mass., is negotiating with the Woburn-Reading Bus Company, Inc., for the purchase of its good will and equipment in Woburn, Stoneham, Reading, Wakefield, Burlington and Billerica. The bus company was started some years ago when the Eastern Massachusetts abandoned the tracks in these cities and towns, and is operating bus lines out of Woburn to Reading, to Billerica and Burlington, and from Reading to Wakefield. Now the Eastern Massachusetts is willing to reclaim the territory, to continue the bus lines already established and perhaps operate others as feeders of its trolley system.

John F. Lovell, who organized and owns the Woburn-Reading Bus Company, has recently taken over the territory which the Concord, Maynard & Hudson Street Railway, a bankrupt road, abandoned, and he intends to give more personal attention to that field if he can reach an agreement with the Eastern Massachusetts Street Railway, relieving him of the jitney service in and out of Woburn.

State authority has been granted to the Eastern Massachusetts to operate bus lines in any part of Massachusetts within the reach of its system, provided it secures permits from the local authorities. It has already secured a permit from Stoneham and has filed applications for permits in Woburn, Wakefield, Reading and Burlington.

Jitney Regulatory Ordinance Introduced in Terre Haute

The first regulatory jitney ordinance including many stringent provisions for the operation of jitneys was introduced to the City Council of Terre Haute, Ind., on June 7. If the ordinance is passed jitneys will be barred from streets on which electric railway cars operate. This will put an end to the accumulation of jitneys in parking spaces on Wabash Avenue.

According to the ordinance as drafted, when the jitney operator applies to the city comptroller for a license he must state, besides his own name and address, the names of all persons outside of himself who will be liable to operate the car.

No person under eighteen years of age will be allowed to drive a jitney nor one who is not physically fit. No person who has been convicted more than twice for violating the speed law nor one who has been convicted of transporting liquor or any other offense in connection with an automobile will be licensed.

With the application must be stated the route which the applicant expects to drive, and the hours which he intends driving. The time limit for one day is nine hours of continuous driving. The yearly fees for cars used as jitneys will be $15 for cars carrying five passengers including the driver, $25 for cars carrying more than five and less than eight including the driver, and $35 for cars carrying more than seven, including the driver.

A bond of $20,000 will be required of the driver if his car carries more than seven passengers. For failing to comply with the ordinance and its provisions the driver is liable to have his license revoked and upon conviction is liable to any punishment not to exceed $300 and costs and 180 days imprisonment.

The ordinance was referred to the committee on ordinance. The ordinance refers only to vehicles carrying passengers over fixed routes inside of the city. The regulations have nothing to do with hotel buses, cabs or taxis charging fares of not less than 25 cents.

New Fare Plan in Bellingham

The Puget Sound Power & Light Company, operating the railway system in Bellingham, Wash., on May 31 announced that the experimental tariff of twenty tickets for $1 was discontinued and a new experimental plan of selling four tickets for 25 cents or sixteen tickets for $1 placed in effect for ninety days. The company announced that the reason for discontinuing the lower tariff was that the increase in return was not sufficient and that the company was losing steadily on the fare. The City Council permitted the company to introduce the new tariff, but Mayor E. T. Mathes sent a letter to the Public Service Commission at Olympia protesting the higher car fare and suggesting that "to the minds of a great number of citizens the evidence is not conclusive that the cost of maintenance (under the 5-cent fare) has been readjusted to meet the new conditions, and the opinion is held that other phases of the question might well be considered before a permanent advance in rates is ordered." The Mayor also asks that the commission order an extension of the Meridian Street car line to the entrance of Cornwall Park, and if this could not be profitably made, he suggests that auto bus service might meet the need.

Utah Power & Light Safety First Window Display



A very effective "Safety First" window display was exhibited by the Utah Power & Light Company at Salt Lake City during National Safety Week, from June 4 to 9 inclusive.

A miniature locomotive, electric street car and two automobiles were shown approaching a railroad crossing. Considerable interest and attention were attracted by the display, which offered a very impressive visualization of the disastrous results of such situations.

Eight Cents in Youngstown

Fares on the lines of the Youngstown Municipal Railway were advanced on June 11 to 8 cents or seven tickets for 50 cents. The fare increase was announced on June 9, when Commissioner Engle received official word from the company. In making the announcement G. T. Seely, president and general manager of the company, stated that if jitneys were eliminated it would be possible to reduce fares as well as supply ample additional bus and car service. However, on June 11 the ordinance giving the safety director power to bar jitneys from the congested district was again tabled for one week.

The weekly pass in Youngstown was discontinued on April 1. The new rate of fare adopted for a trial period was 7 cents cash, three tickets for 20 cents, and 1 cent for a transfer. The rate previously in effect was 9 cents cash, six tickets for 50 cents, 1 cent for a transfer and an unlimited ride weekly pass for $1.25. Youngstown's fare troubles have been followed in the ELECTRIC RAILWAY JOURNAL.

Know Your Buses—New York's Conception of Education

If concentration on something desired spells attainment, then inhabitants of New York will be transported by buses and buses only in the near future. In the twenty-fifth anniversary of the consolidation of Greater New York the city finds another opportunity to extol this method of transportation as a contribution to the present welfare and future development of the city. At the Municipal Education Exposition now going on at the Grand Central Palace the Department of Plant and Structures is enjoying a respite from the labors of bridge and highway construction and is reveling in the statistical feats which are placarded on the wall for the consolation and edification of the city traction magnates and the small town bus promoters who are celebrating the quarter century mark of Greater New York.

Here are some things the department says about the motor bus: Under municipal ownership and operation they would be profitable to the city. On the basis of 100 buses on a 5-cent fare there is an estimated daily profit of $376.80, or an annual profit of $137,532. There are many reasons why the motor bus will aid in solving serious street congestion and one of these is that the bus would eliminate the safety zones, thus leaving in the roadway additional space for traffic. In addition is is said that the bus is more economical than the street cars, the only capital charges being the bus and garage. Further, the bus renders better service because it meets with no delay because of traffic blocks and is not put out of service by the closing of streets and numerous other causes.

Though the department is partial to the bus, it can't be said that it doesn't recognize electric railway transportation, trackless trolleys, etc., for it shows at the exhibit pictures of trackless trolleys being operated under its own supervision. Then, too, there is quite some display of street car appliances and appurtenances. There are models of the various types of motors on the elevated, surface and subway cars, including safety car motors, a model standard trolley base, and lightining protection equipment for street railway cars and for trackless trolleys.

The booth in charge of the Department of Plant and Structures has one of the most interesting displays at the exposition, which includes the activities and aims of every New York City department.

Last Minute Ruling by Commission Prevents Fare Rise in Buffalo

Eleventh hour notice was served on the International Railway, Buffalo, by the Public Service Commission that it could not put into effect the proposed 8-cent fare on the local lines of the company in Buffalo. The International had planned to make the 8-cent fare effective at midnight June 8 or thirty days after formal notice of the proposed increase had been filed with the Public Service Commission. The commission has suspended the proposed fare increase for 120 days. In its order suspending the fare increase, the commission held that it would be unjust to the public to allow a fare increase at this time, inasmuch as the rate proceeding is now pending before the commission. This proceeding was brought by the city to force the return of the 5-cent fare. The fare is now 7 cents on local lines or four tokens for 25 cents. The company proposed to charge 8 cents or four tokens for 30 cents.

In announcing its plan to charge an 8-cent fare, the International is charged by the municipal authorities with ignoring the new law just signed by Governor Smith which prevents public utility corporations from raising its rates until after a hearing has been held by the Public Service Commission and a decision has been handed down by that board. This law was referred to in the ELECTRIC RAILWAY JOURNAL, issue of June 9. The International acted under a former law which allows public utility companies to file notice of the proposed advance and put it into effect after thirty days upon one-day notice to the public, providing the increase is not suspended by the Public Service Commission.

The city law department stood ready to apply to the courts for an injunction restraining the railway from putting into effect the 8-cent fare, if the Public Service Commission had not acted within a few hours.

The decision of the commission in suspending the proposed increase was received from Albany twelve hours before the increase was to have gone into effect. The patrons of the lines were prepared for the increase and were making large purchases of fare tokens at the rate of four for 25 cents. The company had planned to use similar tokens which would be sold four for 30 cents. It is estimated thousands of dollars were invested by the car riders in tokens on the day before the proposed increase was to have become effective.

Twenty One-Man Cars in Operation.—The Oklahoma railway has been using twenty one-man cars in regular schedule all day service in Oklahoma City. They are used on five routes, supplemented with tripper service with large cars during the busy hours. The results of the one-man car operation have not been thoroughly tried out.

Pamphlet Issued as Traffic Guide.—The Atlanta Motor Club has prepared a pocket size pamphlet "for the guidance of motorists, pedestrians and people who ride the street car." The booklet explains the law's requirements on traffic problems. *Two Bells*, the official publication of the Georgia Railway & Power Company, suggests a ten-minute study of the booklet.

Favor Jitneys.—At an election held on June 9 the citizens of Houston voted to retain the jitneys by a vote of 7,261 to 5,083. The Houston Electric Company has made no announcement as to what course it will follow in order to obtain financial relief made necessary by jitney competition.

Clinton Fare Cut.—The Terre Haute, Indianapolis & Eastern Traction Company is experimenting with another lower fare plan. A little more than a year ago the company introduced the $1 weekly pass on the lines in Terre Haute. The present reduction will affect interurban patrons and will be introduced on the Clinton line. A 100-mile mileage ticket will be sold for 1¼ cents per mile. If the idea appeals to the Clinton interurban riders these fare strips will be introduced on all of the other interurban lines entering Terre Haute. The announcement of the fare cut was made by E. M. Walker, general manager of the Terre Haute division.

Amsterdam Seeks Return to Five-Cent Fare.—Testimony was taken on May 29 before Executive Clerk Harry M. Ingram of the Public Service Commission by the Fonda, Johnstown & Gloversville Railroad to show that during the last four months the company had not paid in running expenses. The company is seeking authority to continue its present fare of 8 cents in the city of Amsterdam. The city authorities had served notice on the company that it must reduce its fare to 5 cents. Amsterdam was represented by Ambrose P. Fitz James, corporation counsel; John Boyd, chairman of the committee on public works of the Common Council, and Jacob Labischner, city engineer. The railroad company was represented by Wesley Maider and C. S. Nisbett, attorneys, and J. Ledlie Hees, president; William H. Collins, general manager, and Frank Burton, secretary.

Personal Items

11,000 Trainmen Under Him

New Superintendent of Transportation at Chicago Has One of Biggest Jobs of Its Kind

C. H. Evenson, who has been appointed superintendent of transportation of the Chicago Surface Lines, has been connected with the transportation companies in Chicago for fifteen years. Mr. Evenson was only twenty-three years old when in 1908 he entered the service of the Chicago City Railway as a clerk. Then for three years he was secretary to the president of the Calumet & South Chicago Railway.

In a semi-official post of this kind transportation affairs passed before him daily in cinema review, and being of the type that he is, Mr. Evenson saw the picture as a whole and profited accordingly. All phases of the business had their appeal for Mr. Evenson, but he became interested especially in the problems of management and men. Under given circumstances all similar machines will act alike, but under given circumstances not all human beings will act alike. Here enters the fascination of the study of human reactions. And here was where Mr. Evenson quickly showed himself to be most competent.



C. H. Evenson

At first Mr. Evenson's work brought him in touch with the matter only on its academic side, but he was building steadily for the future and in 1920, after more than ten years' service in a secretarial capacity, came real opportunity with Mr. Evenson's appointment to the position of assistant superintendent of transportation. And now in less than three years he is advanced to the very responsible post of superintendent in charge of 11,000 trainmen and the operation of 3,100 cars. There are few jobs bigger than this anywhere in the transportation world.

Four years after he entered the service of the Chicago City Railway in 1908 Mr. Evenson was promoted to the position of secretary to President Leonard A. Busby. When Mr. Busby was elected president of the Chicago Surface Lines in 1914 Mr. Evenson was retained as his secretary. When Henry A. Blair became president in 1920, he was made assistant superintendent of transportation. As superintendent of transportation he succeeds F. P. Edinger, resigned.

One of Mr. Evenson's accomplishments is that he has a great faculty of winning first prize at the annual golf tournaments of the Surface Lines.

William A. Whitney, general manager of the Utah-Idaho Central and the Utah Rapid Transit Railroads for the past six years, has been made active head of the Mount Hood and Sumpter Valley Railroads in Oregon, as well as manager in charge of operations of the Oregon Lumber Company mills in Oregon and Washington. Mr. Whitney will remain with the two Utah electric roads as vice-president and director. He will be the active head of the Eccles lumber and railroad interests in Oregon and Washington. Mr. Whitney came to Ogden as head of the electric roads in 1917 from the position of superintendent of transportation for the Union Pacific. Prior to that time he was superintendent of several different divisions of the Union Pacific and from 1911 to 1914 was superintendent of the Sacramento and Oakland divisions of the road. In railroad circles Mr. Whitney is regarded as one of the ablest operating officials in the West. P. H. Mulcahy, who has been auditor and assistant manager of the above electric roads, will be general manager of the two lines.

Albert H. Sisson, better known to his many friends as "Pop," has, as assistant to the president, joined forces with the Columbia Machine Works & Malleable Iron Company of 3303 Atlantic Avenue, Brooklyn, N. Y. Mr. Sisson first appeared on the railroad horizon when he founded the Jewett Car Company in 1897. In 1905 the Jewett company was purchased by the St. Louis Car Company and "Pop" went with it, acting as general manager of the latter organization until 1908. He then became general manager of Forsythe Brothers Company and remained there for five years, until, in 1913, he was appointed president of the Southern Car Company. In 1917 he joined the National Pneumatic Company as a special representative and continued to occupy this position until making his present connection with the Columbia Machine Works.

John W. Hulme Resigns at Buffalo

Superintendent of Equipment of International Railway Resigns After Serving Company Ten Years

John W. Hulme has resigned as superintendent of equipment of the International Railway, Buffalo, N. Y., to be associated with the maintenance department of the Interborough Rapid Transit Company as master car builder. It is understood that Mr. Hulme was anxious to give up his work in Buffalo six months ago, but at that time the company was engaged in a strike, so Mr. Hulme did not press the matter. The strike is now over, and Mr. Hulme has asked definitely to be released, so that his resignation has been accepted. He will remain with the company in a consulting capacity for a month or more.

Mr. Hulme has made an enviable record in Buffalo as superintendent of equipment, a position for which his previous experience had well qualified him, as he has been engaged in the mechanical side of electric railway service since 1904. At that time he entered the employ of the Chicago Elevated System, after an experience of about five years with the Western Electric Company, for which he installed its exhibit at the St. Louis fair. He remained with the Chicago Elevated System for five years, and in 1909 he resigned his position of inspection barn foreman with that property to accept that of general inspection foreman of construction for the Hudson & Manhattan Railroad. Subsequently he was made general foreman of inspection of that company. He remained with this property until 1913, when he accepted a position in the car equipment department of the Interborough Rapid Transit Company. He was appointed superintendent of equipment of the International Railway in January, 1918.



J. W. Hulme

Mr. Hulme has taken an active part in the work of the American Electric Railway Engineering Association and has served on several of its committees. He also has contributed articles on technical topics to this paper.

Heavy Traction Expert with Virginian

Engineer in Charge of Southern Electrification Has Had Wide Experience in Similar Undertakings

Hugh Pattison, whose appointment as engineer of electric traction of the Virginian Railway was noted in the ELECTRIC RAILWAY JOURNAL for May 19, was formerly with the Illinois Central Railroad, with which for the last two years he has been engaged on preparation work for the coming electrification of the Chicago terminal. In his new post Mr. Pattison will have charge of directing the extensive electrification program of the Virginian Railway.

Mr. Pattison was born in Maryland on Aug. 3, 1872. He was graduated from the Johns Hopkins University, electrical engineering course, in 1892. His first position was that of foreman electrician of the Norfolk, Va., Navy Yard, wiring and installing electric apparatus on naval vessels.

In 1893 he became assistant engineer with Sprague, Duncan & Hutchinson, consulting engineers of Baltimore. From 1894 to 1903 he was associated as engineering assistant to Frank J. Sprague, vice-president and technical director of the Sprague Electric Company in New York, and assisted in equipping and operating Sprague multiple-unit control on the Boston Elevated Railroad, and also in Brooklyn. During this period he was also resident engineer representing Cary T. Hutchinson, consulting engineer, New York, in charge of design and erection of a new power plant for the Pennsylvania Steel Company at Steelton, Pa., including substations, high tension transmission line, and lighting and power equipment for the shop.

In 1905 Mr. Pattison joined Westinghouse, Church, Kerr & Company as an engineer, having charge of the work on foundation for the Long Island City power house of the Pennsylvania Railroad, the design and installation of the multiple unit cars for the Long Island electrification; also the design and construction of the brick and concrete inspection shops and carhouses. All types of control since that period have been more or less patterned after the Long Island equipment. That installation is recognized as the first real achievement in multiple-unit operation for suburban service.

From 1905 to 1911 Mr. Pattison was assistant engineer of electric traction for George Gibbs, consulting engineer. During this period, when the Pennsylvania tunnel electrification was carried out, Mr. Pattison was superintendent of construction in charge of the Pennsylvania Tunnel & Terminal Railroad. Here again was a very marked achievement in the working out of all engineering details for the free movement of locomotives and multiple-unit trains through this tunnel and terminal.

Later, Mr. Pattison had charge of the electrification of the West Jersey & Seashore Railroad from Camden to Atlantic City. He also built an experimental single-phase electric railway on Long Island and had charge of the conduct of locomotive test on the West Jersey & Seashore Railroad to determine the effect on track. As superintendent of construction work in connection with the electrification of the Pennsylvania Railroad at New York, he was responsible for the foundation and erection of a steel tower transmission line across the New Jersey Meadows, all substation equipment, third-rail and bonding, and all lighting, air and water equipment in tunnels and yards.

The work performed by Mr. Pattison on these undertakings was recognized in 1911 when he was appointed engineer in charge of the Chicago Association of Commerce Committees in the study of smoke abatement and the electrification of terminal railways in Chicago. This undertaking covered a period of approximately four years, and it is admitted that the most comprehensive study of electrification of yards was made by this committee and, as previously mentioned, Mr. Pattison was in charge of practically all of the electric engineering studies and reports.

When the war broke out Mr. Pattison was placed in charge of inspection and was finally made assistant to the general manager of the Remington Arms Company, later the Eddystone Rifle Plant of the Midvale Steel & Ordnance Company, at Eddystone, Pa. At the close of the war this factory discontinued operations and Mr. Pattison joined the heavy traction staff of the Westinghouse Electric & Manufacturing Company under F. H. Shepard, director of heavy traction.

Twenty-five Years a Secretary

Mrs. Roberts of Los Angeles Railway Remembered with Presents from Company Executives

Not all the honors nor all the worries of the electric railway business go to the sterner sex. Witness Mrs. Mabel Knight Roberts, secretary to G. J. Kuhrts, general manager of the Los Angeles Railway, who recently completed twenty-five years of service with the company. Her silver service anniversary, celebrated recently, was remembered with presents from executives of the company.



Mrs. Mabel K. Roberts

Mrs. Roberts has been secretary to every general manager the company has had. Starting in 1898, Mrs. Roberts was secretary to F. W. Wood, then general manager. The property was owned by Eastern capital, and a small two-story frame building at Sixth and Central Streets served as headquarters for the railway, which Mrs. Roberts has seen develop into an extensive system serving nearly 1,000,000 passengers a day.

In 1898 the company had two car dispatchers, one for day and one for relief and night service. The cars were of various types.

The latter months of 1898 were busy ones which Mrs. Roberts well remembers. It was then that Henry E. Huntington acquired the property and proceeded to reconstruct the entire railway system.

In 1904 Mrs. Roberts and others of the general manager's office moved from the small frame building on Central Avenue to the Pacific Electric Building at Sixth and Main, which was completed that year.

H. G. Bonner, general manager of the Meridian Light & Railway Company, Meridian, Miss., will resign on July 1 to take charge of the Ohio Public Service Company, Alliance, Ohio. He will be succeeded at Meridian by W. R. Phipps. Mr. Bonner first became connected with the Doherty organization in 1913.

Obituary

Dr. Louis Bell

Dr. Louis Bell of Boston, well known consulting electrical engineer, died in West Newton, Mass., on June 14 at the age of fifty-nine years. One of his outstanding achievements was the design and installation of what is said to have been the first polyphase power plant in this country. This was at Taftville, Conn., about 1894. He organized the course of electrical engineering at Purdue University. Dr. Bell was editor of the *Electrical World* for two years from 1890 to 1892 and after he gave up active editorial work was a frequent contributor on technical subjects to the electrical press, including the ELECTRIC RAILWAY JOURNAL. For three years he was chief engineer of the electric power transmission department of the General Electric Company. He was a former president of the Illuminating Engineering Society, lectured at Harvard University and the Massachusetts Institute of Technology and was a member of the advisory committee of the Council of National Defense. He was the author of numerous books on electric lighting and power distribution.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Linseed Oil Combination Dissolved

Competition Is Restrained by Subscription Agreement, According to Supreme Court Decision

"Open price" associations are unlawful when they restrain competition, according to a decision of the United States Supreme Court handed down June 4 in the case of the American Linseed Oil Company, et al., comprising twelve corporations, in six different States, which manufacture and distribute linseed oil cake and meal, and Julian Armstrong, who operates at Chicago under the name of Armstrong Bureau of Related Industries. The opinion said:

> This bureau conducts a so-called "exchange," through which one subscribing manufacturer may obtain detailed information concerning the affairs of others doing a like business. The defendant "crushers" constitute one of the groups who contract for this service. They manufacture and distribute throughout the Union a very large part of the linseed products consumed therein, and prior to the challenged combination were active, unrestrained competitors. Sometime in September or October, 1918, each of them entered into an identical written "subscription agreement" with the Armstrong bureau, and a year thereafter signed another, not essentially different.

The crushers secure from this bureau information relating to markets and other data and report to it all sales, quotations, offerings and other statistics. The obvious policy of this arrangement, according to the decision, was "to submerge the competition theretofore existing among the subscribers." Continuing, the decision said:

> The Sherman act was intended to secure equality of opportunity and to protect the public against evils commonly incident to monopolies and those abnormal contracts and combinations which tend directly to suppress the conflict for advantage called competition—the play of the contending forces ordinarily engendered by honest desire for gain.
>
> Certain it is that the defendants are associated in a new form of combination and are resorting to methods which are not normal. If, looking at the entire contract by which they are bound together, in the light of what has been done under it, the court can see that its necessary tendency is to suppress competition in trade between the States the combination must be declared unlawful. That such is its tendency, we think, must be affirmed."

Permanent Foreign Outlets Should Be Maintained

An old abuse, so costly in the past to American prestige abroad, according to the Department of Commerce, is again creeping into our export trade. Under the allurements of domestic boom conditions many manufacturers are showing increasing apathy to foreign contacts. The sound policy of definite allotments for export is being ignored in far too many cases. Unless this disloyalty to firmly established foreign contacts is promptly overcome, American commercial prestige and good will abroad are likely to suffer serious damage.

If the United States is to level out the valleys of periodic depression in the curve of its business cycles and is to keep its factories and farms steadily and fully occupied, the maintenance of permanent foreign outlets must be assured regardless of fluctuations in domestic market conditions. It does not improve the standing of America's business abroad to have the first sign of better domestic trade bring about the immediate abandonment of all interest in those foreign contacts which had been hailed with such joy and solicitous regard during the dark days of 1921.

Steady Trend Toward Electric Heating

Two important factors, characteristic of general conditions since the war, have strongly influenced the development of car heating. In the first place anthracite coal suitable for use in the ordinary coal stove has more than doubled in price. The cost of electric power, on the other hand, has increased very little, because greater efficiency in production has largely balanced higher fuel cost. For this reason the differential between the cost of heating by coal and heating by electricity is not so great at the present time as it used to be.

In the second place the wages of common labor have doubled or trebled in recent years, and this has greatly increased the cost of handling fuel and ashes at the car houses. Coal stoves require a good deal of attention, not only for operation, but also for upkeep, because grates, etc., at times have to be replaced, and at present wages such attention is a serious item of expense. With electric heat a very considerable saving can be made in labor costs.

The average length of time that a car is in operation each day has some bearing on the question. Where the period of daily service is short, electricity has the advantage because it produces adequate results with a minimum amount of manual labor, but where the period of daily service is long, this advantage is less because the labor cost becomes secondary to fuel cost.

Railway cars are particularly well adapted for the use of electric heat because many people are seated in a comparatively small space with a low roof overhead and the volume of air to be heated per passenger is smaller than in an ordinary room.

Manufacturers of electric heaters report a rapidly increasing demand for equipment of this type during the past year. This is the natural reflection of the changed conditions. Some very interesting development work in this field is also under way and with its completion the use of the "fireless heaters" is likely to be given further impetus. One manufacturer estimates that from 50 to 60 per cent of the electric railways in the country are now using electric car heating.

Railway Will Receive Energy from Electric Company

The Eastern Massachusetts Street Railway has entered into a contract with the Lynn Gas & Electric Company by which the railway will be supplied with all of the electrical energy required for the operation of its electric cars in its Lynn division, consisting of about 60 miles of track in Lynn, Saugus and Swampscott.

The light company expects to begin to supply electric power under the contract not later than Feb. 15, 1924. The power will be in the form of 13,200-volt a.c. current, transmitted through about 1 mile of duplicate underground cables to the new $125,000 substation of the railway company to be erected at the center of the d.c. distribution near the corner of Union and Washington Streets, in Lynn. The substation is to house three 1,500-kw. standard rotary convertible units and control equipment, with room for an additional 1,500-kw. unit.

A good deal of consideration was given to an automatic substation, but due to the fact that there was to be only one station in the division, consisting of about 24 square miles and a population of 118,000, it was deemed advisable to make the substation a manually operated one.

The automatic substation building will be a concrete brick and steel fireproof structure about 32 x 68 ft. long and 32 ft. in height, including the basement. The old power plant to be abandoned was built about thirty-two years ago.

Metal, Coal and Material Prices

Metals—New York	June 13
Copper, electrolytic, cents per lb.	15.125
Copper wire base, cents per lb.	18 00
Lead, cents per lb.	7 25
Zinc, cents per lb.	6.45
Tin, Straits, cents per lb.	42.00
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$6 125
Somerset mine run, Boston, net tons	2 875
Pittsburgh mine run, Pittsburgh, net tons	2.20
Franklin, Ill., screenings, Chicago, net tons	1 80
Central, Ill., screenings, Chicago, net tons	1.875
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$7.75
Weatherproof wire base, N. Y., cents per lb.	19.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$1.13
White lead, in oil (100-lb. keg), N. Y., cents per lb.	13.125
Turpentine, (bbl. lots), N.Y., per gal.	$1.06

Rolling Stock

New Orleans Public Service, Inc., will shortly ask for bids for forty new cars, according to an announcement made by H. B. Flowers, president.

Montreal & Southern Counties Railway, Montreal, Que., expects to purchase one motor baggage car and two suburban passenger trailer cars.

Oklahoma Railway has purchased twenty one-man cars, which have been installed and placed in operation since Jan. 1 down to the present time.

Louisville Railway has ordered ten motor cars with a seating capacity of fifty passengers and thirty trailers. The new equipment, which will replace the rolling stock depleted as a result of serious carhouse fires, will cost $330,000. The cars have been purchased from the Kuhlman Car Company of Cleveland for Nov. 1.

Connecticut Company has purchased fifty cars from the Osgood-Bradley Car Company. The specifications of these cars are as follows:

Date order was placed	May 16, 1923
Date of delivery	Commencing August, 1923
Type of car	D.T. steel motor passenger; one-man, two-man type
Seating capacity	47
Total weight, approximately	30,000 lb.
Bolster centers	21 ft. 4½ in.
Length over all	44 ft.
Truck wheelbase	5 ft. 4 in.
Width over eaves	8 ft. 4½ in.
Height, rail to trolley base	10 ft. 8 in.
Body	Semi-steel
Interior trim	Cherry or natural birch
Headlining	Agasote or Nevasplit
Roof	Arch
Air brakes	Westinghouse
Axles	A. E. R. A. Standard
Armature bearings	Friction
Bumpers	Channel
Car signal system	Consolidated
Car trimmings	Bronze statuary finish
Center and side bearings	Bradley
Conduits and junction boxes	General Electric and Westinghouse
Control	General Electric and Westinghouse Type K
Couplers	Connecticut Company standard
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote
Destination signs	Hunter
Door operating mechanism	National Pneumatic
Fare boxes	Johnson
Wheelguards	H. B.
Gears and pinions	General Electric and Westinghouse
Hand brakes	Bradley
Heater equipment	Gold panel heaters
Headlights	Golden Glow
Journal bearings	Friction
Journal boxes	Symington
Lightning arresters	General Electric and Westinghouse
Motors:	
25 cars	4 General Electric 264
25 cars	4 Westinghouse 508
Inside hung.	
Paint and varnish:	
Exterior	Sherwin Williams
Interior	Castillian System
Registers	International
Sanders	Bradley
Sash fixtures	J. L. Howard Company
Seats	Bradley
Seating material	Rattan
Step treads	Mason safety
Trolley catchers	Ohio Brass
Trolley base	U. S. No. 13
Trolley wheels	5⅓ in.
Trucks	Osgood-Bradley—OBC 30-64
Ventilators	Bradley exhaust
Wheels	26 in. steel
Safety equipment	Safety Devices Company

Paris-Orleans Railway, Paris, has just placed an order for two electric locomotives with Brown-Boveri & Company, Ltd., of Baden, Switzerland. These two locomotives, which are for express passenger trains, will be run on the Paris-Vierzon section. Each locomotive is equipped with four motors and a type of drive after the new system of the Baden firm. The capacity of each locomotive is 4,000 hp., the maximum speed 130 km. per hour. The weight, only 116 tons, is relatively small. The length of the engines is nearly 18 meters. All the mechanical parts are supplied by the Winterthur Locomotive Works.

Track and Roadway

Hamilton (Ont.) Street Railway proposes to lay new tracks on Main Street from Ottawa Street. This project is estimated at $40,000.

Tri-City Railway, Davenport, Iowa, has begun relaying tracks on Brady Street, in Davenport. The estimated cost is $58,000.

Des Moines City Railway will spend approximately $460,000 in improvements this year. Of this amount $326,000 will be for track construction, $30,000 for construction equipment and $50,000 for substation equipment.

Portland Railway, Light & Power Company, Portland, Ore., has recently completed trolley line construction, including the laying of 122-lb. rails, on Hawthorne Avenue, at a cost of $40,000. Other improvements recently completed represent an expenditure of $10,000.

Los Angeles Railway has started the double-tracking of the "C" Line on Douglas Streets from Bellevue to the end of the line. This is one of the track construction jobs to be carried out in the extensive program for the improvement of service. Eight tracks in the new carhouse which is under construction at South Park will soon be available for the storage of cars.

Power Houses, Shops and Buildings

Milwaukee Electric Railway & Light Company will erect in Racine a modern steel and brick car house building, 80 ft. x 160 ft., to cost between $75,000 and $100,000.

Arkansas City - Winfield Northern Railway, Wichita, Kan., will discontinue its power plant now in use and will install an up-to-date substation. Power will be purchased from the Kansas Gas & Electric Company.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont., will spend $300,000 for improvements on the building of a modern terminal, passenger station and freight building at St. Catharines.

Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa, has ordered a new 10,000-kw. turbine and condenser. Improvements will be effected necessary to their installation for the generating station at Fraser, Iowa. The new equipment, which will cost $400,000, will be delivered about Jan. 1.

Trade Notes

General Electric Company, Schenectady, N. Y., has announced a number of important improvements in its P. C. multiple-unit control for train operation. The main air engine has been redesigned to include a spring which eliminates delay in passing from the "off" to the first position. After fitness tests, phosphor bronze stems and monel metal seats have been adopted to lengthen the life of magnet valve parts. Other improvements include a new type of control finger which cannot stub even if worn through at the line of contact. A new accelerating relay has also been designed with features including brush contact, a better and more accurate means of adjusting drop out point of series armature and a guard to prevent chance of affecting adjustment by careless handling.

Surplus Steel Exchange, Inc., New York, N. Y., has been formed for the purpose of presenting an outlet for surplus stock material. Surplus stocks of steel will be listed free of charge and stock lists mailed to users of similar material at frequent intervals. A commission will be charged only on sales actually made as the exchange does not propose to purchase material, but to act solely in the capacity of agent. It is known that very large quantities of steel at all times lie idle in the store rooms of manufacturers who for lack of organization or knowledge of possible buyers do not make any effort to reduce inventory, or make way for new material from the steel mills, and it is the expectation that this valuable service can be rendered at a moderate cost. The officers of the new company are Robert D. McCarter, president; George E. Dix, vice-president; William L. Cooper, treasurer, and Edward Michaud, secretary and general manager. The offices are at 7 Dey Street, New York City.

New Advertising Literature

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 47,672, describing Type PB-53 and Type PB-54 control relays.

Pennsylvania Crusher Company, Philadelphia, Pa., has issued Bulletin 1005 illustrating and describing the complete line of heavy duty "Pennsylvania" Steel-built Hammer mills for cement rock and limestone. The pamphlet contains sixteen pages.

Combustion Engineering Corporation, New York, has published a pamphlet on Quinn pure oil burning equipment, with a list of some representative installations among industrial plants. Particulars are also given of the Quinn oil burner, a comparison on the operating and equipment costs of oil versus coal and articles on the design of furnaces for oil burning and the economy of oil as a fuel.

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Duluth, Minn.....Wolvin Building
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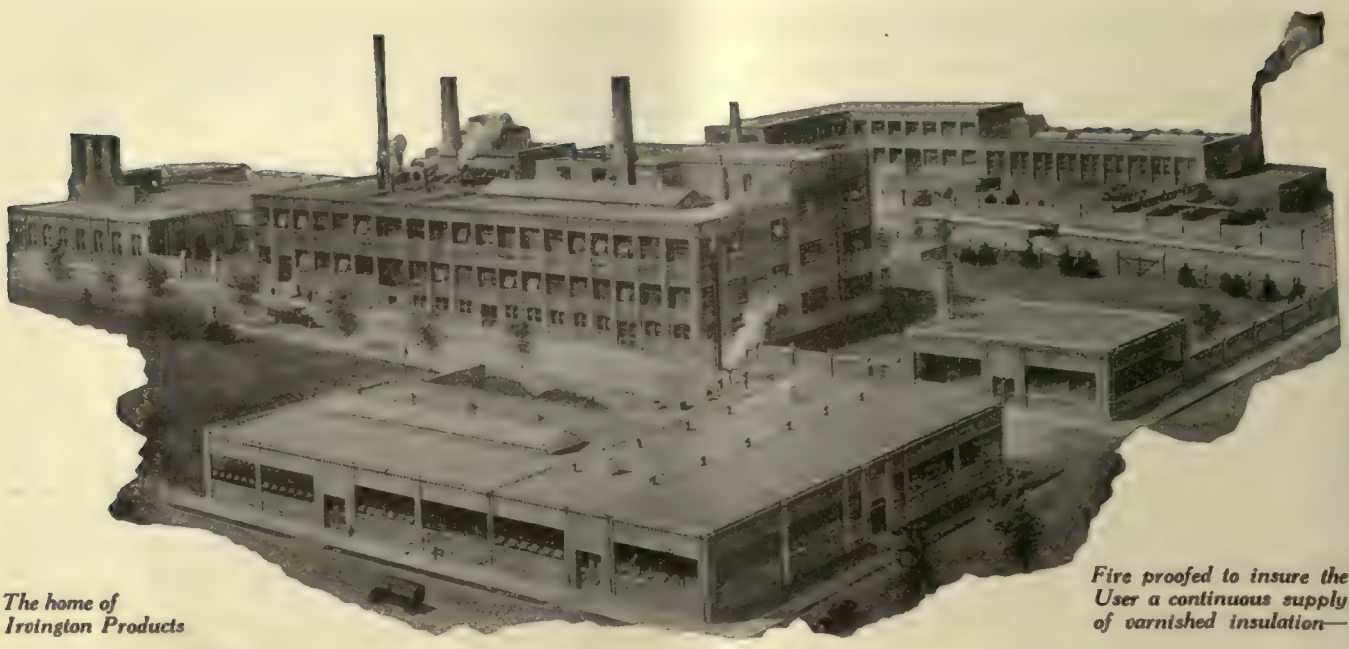
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EXPORT DEPARTMENT: 30 Church St., New York, N. Y., U. S. A.

Should a Bank Loan Money for Advertising?

by FESTUS J. WADE
President, MERCANTILE TRUST COMPANY *of St. Louis*

WHEN we strike at advertising, meaning, of course, efficiently applied advertising, we strike at salesmanship, and the heart of business. For the banker to do anything to retard business right now is suicide.

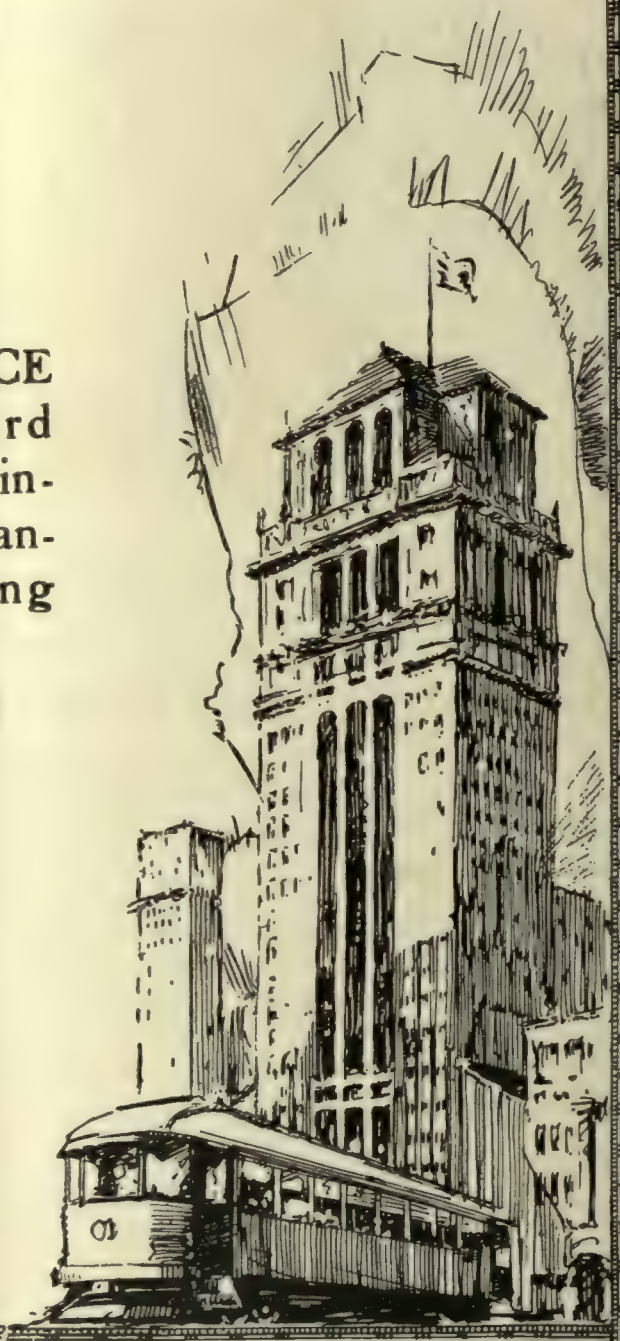
When the merchant pulls down his shingle and waits for business to come to him in a buyers' market, we laugh at him, and call him a poor business man.

When he is forced to cut down one of his best methods of selling because his banker considers advertising an unnecessary item of expense and refuses an otherwise deserved loan purely on that principle, it is my humble opinion that we should laugh at the banker, and feel sorry for the merchant.

Don't mistake my meaning. It is a basic banking principle that a loan must be well secured, and a firm cannot borrow merely because it is a big and successful advertiser. But the fact that it is a believer in advertising and wants to use a portion of the money for that purpose should never stand in its way when it calls on the Bank's credit department.

[Published by the ELECTRIC RAILWAY JOURNAL in co-operation with The American Association of Advertising Agencies]

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier INCORPORATED

CANDLER BLDG NEW YORK

A super-power survey of the whole United States



Just Out!

Baum's
Atlas of U.S.A. Electric Power Industry

By Frank G. Baum

Consulting Hydro-Electric Engineer

17 x 11½ inches, 34 full-page plates, $10.00 net, postpaid

Think of a super power survey of the whole United States presenting in text, charts, maps and graphs the facts of the power resources and the power demands of the whole country—offering a sound, logical, economical program for the solution of the country's power problems.

That is what Baum's ATLAS is

Read this list of contents

Part I.—Electric Power Industry; Suggested Power Districts and Proposed Constant-Potential Transmission Systems.

Brief History of the United States Electric Power Industry
Present Status of Electrical Industry
Advantage of Grouping Small Plants into Large Systems
Problems of the Power Industry
Suggested Regional Electric Power Districts. Outline of Suggested Regional Power Districts
Constant-Potential Electric Transmission System
Outline of Proposed Constant-Potential Transmission System
Residence, Commercial and Industrial Customers
Summary of Mechanical and Electrical Power in Utilities and Industries
Water Power Developments
Generator Capacity and Output of Central Stations
General Power Service for Industries
Mechanical and Electrical Power and Wage Earners in Manufactures
Mechanical and Electrical Power in Mines and Quarries
Railway Data and Discussion
Effect of Diversity on Load Factor
Economic Proportion of Hydro-Electric and Steam Power

Part II.—Electric Power Transmission; Constant-Potential System.

The Present Power Transmission System
The Constant-Potential Transmission System
Economical Conductor Section
Efficiency of Transmission System and Cost
Need of Large-Capacity Transmission Lines
Service Conditions for Energy-Transmission Routes

Part III.—General Data, United States and World.

Examine this new McGraw-Hill book for 10 days free

The *Electrical World says,* "The nation's resources of water power, coal, oil and gas are known; so are the great power markets. What Mr. Baum has done is to fit one into the other in a masterly fashion, thus indicating the lines along which progress will march. His is a very valuable and far-sighted contribution to the art and economics of electric power transmission and will well repay close study and application."

William S. Murray, Consulting Engineer; former Chairman Superpower Survey says:—

"In the ATLAS OF U. S. A. ELECTRIC POWER INDUSTRY, Mr. Baum has made a remarkable and valuable contribution to the electrical arts, meriting in my opinion, the highest recognition, especially because of the ingenious method he suggests for maintaining constant potential on long and inter-connected transmission systems."

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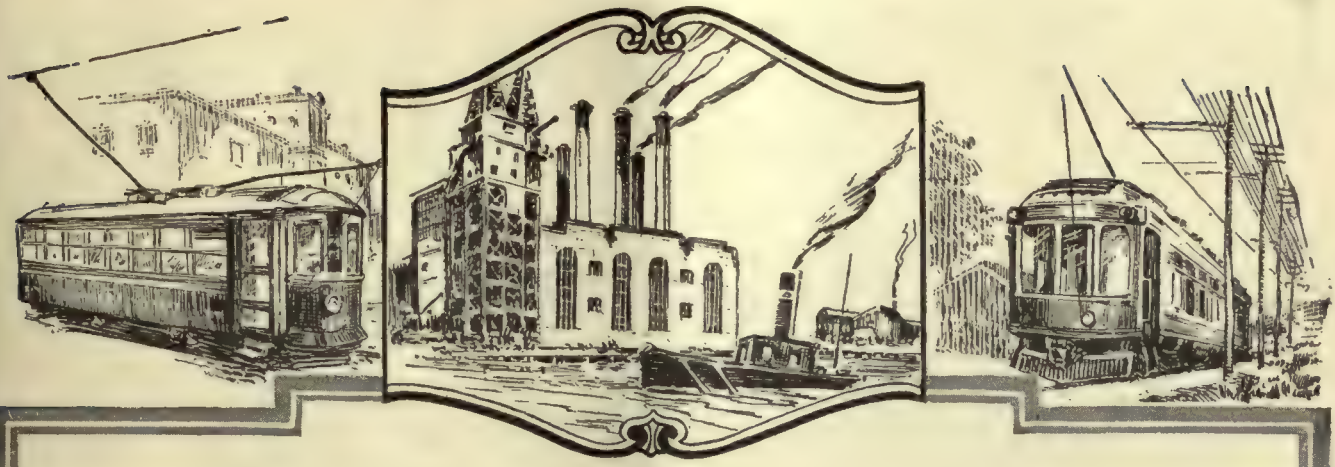
PANTASOTE
TRADE MARK

AGASOTE
TRADE MARK

Standard for Electric Railways

THE PANTASOTE COMPANY

11 Broadway, New York
Peoples Gas Building, Chicago
Monadnock Building, San Francisco



Way for the Break-down Gang!

Traffic stops or parts to right and left to let the emergency truck come through. Everyone knows that on it depends the quick restoration of traffic and, sometimes, even life and limb.

And so you, who are in charge, want it to come along at top speed.

And it will come along at top speed, if you are using

TEXACO GASOLINE
the Volatile Gas

Then, when the driver steps on the accelerator, a lively stream of vaporized Texaco Gasoline shoots into the cylinders and the truck's away.

The truck fairly leaps forward because of the quick pick-up of "the volatile gas."

And this is worth noting. The qualities that make Texaco Gasoline so worth while in the internal combustion engine operate to make it the best gasoline for blow torches. Volatility, Fuel Value, Purity mean ready atomization, high heat content and no danger of sediment blocking needle valves or spray holes.

So, then, you can understand why the sale of Texaco Gasoline to Street Railways and bus lines is keeping pace with the enormous growth of our business in Texaco Street Railway Lubricants.

Nor are the roads neglecting the other Texaco products. They are using large quantities of

TEXACO KEROSENE

for stationary lamps, headlights and tail lamps, where the safety factor is important and where the oil must burn without crusting wicks or frosting glasses.

TEXACO SIGNAL OIL

for hand lamps. This is compounded oil of excellent qualities and noted especially for long burning.

TEXACO 300 BURNING OIL

An uncompounded burning oil (made especially to meet the demand for high flash), used for some types of hand lanterns and stationary lamps.

Some of our best roads use Texaco Petroleum Products all along the line

TEXACO Lubricants TEXACO Greases TEXACO Gasoline TEXACO Burning Oil

THE TEXAS COMPANY
DEPT. R-J - 17 BATTERY PLACE - NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES



MILLER TROLLEY SHOES

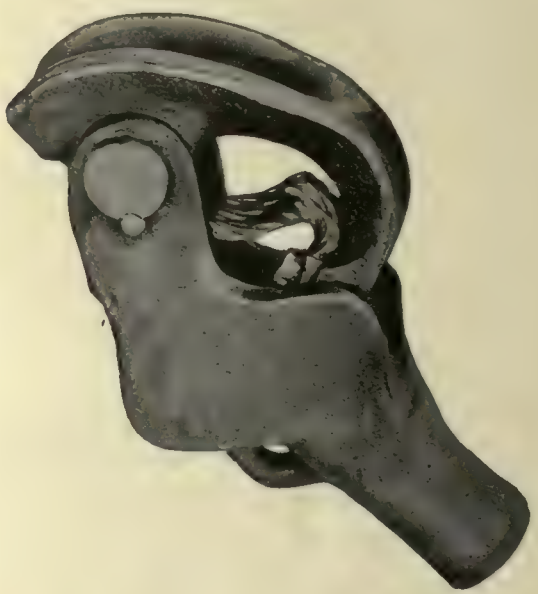
—way down south!

They find them best for the

Orleans-Kenner Traction Co.

On these interurban cars between New Orleans and surrounding cities—Miller Trolley Shoes have proved their worth. As on many other roads which use them, they are preferred to trolley wheels because they cling to the wire, and because they greatly reduce the chances of damage to overhead lines, delays and similar trolley troubles.

You do not have to experiment with Miller Trolley Shoes. The Orleans-Kenner Traction Co., Inc., is only one of fifty odd electric railway systems all over the country, which have tried them, and discovered their advantages and economies.



Write for references

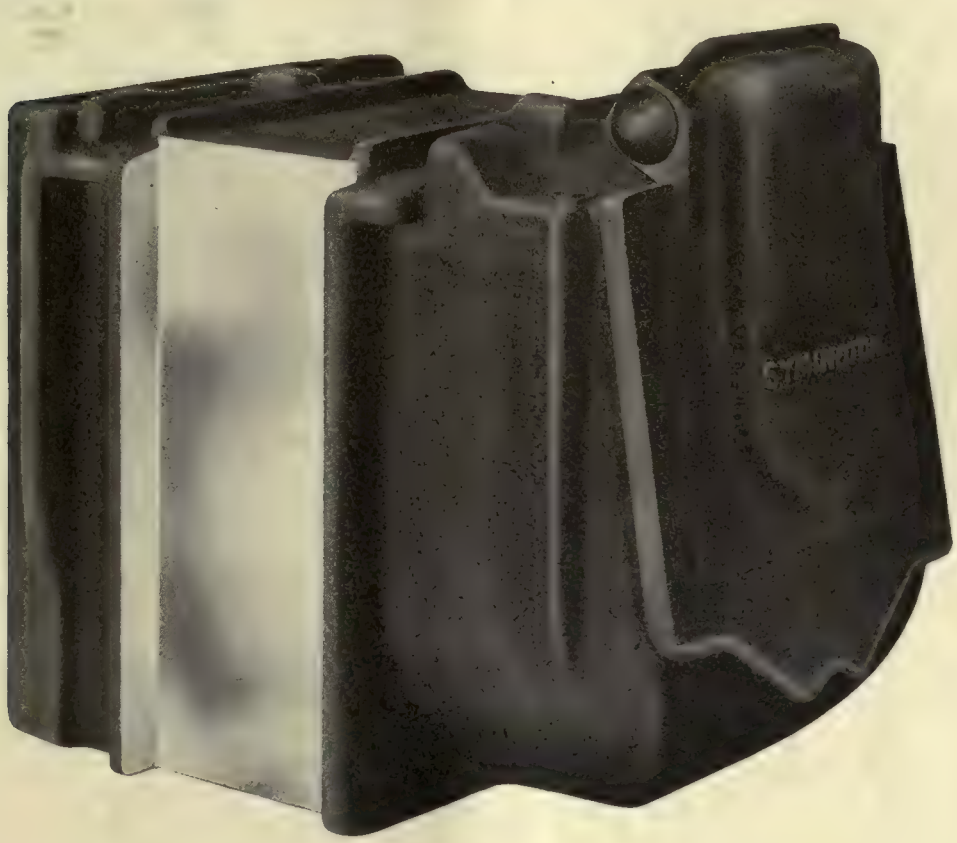
We will gladly put you in touch with officials of other roads which use Miller Trolley Shoes.

MILLER TROLLEY SHOE CO.
Boston-21, Mass.

Western Representative:
Economy Electric Devices Co.
1590 Old Colony Bldg., Chicago, Ill.

SYMINGTON

SEMI-STEEL JOURNAL BOXES



JOURNAL bearing and axle mileage are dependent upon satisfactory journal box performance.

The journal box must have ample strength for the work it has to do; it must carry the axle lubricant and be easy to pack; it must have a permanently tight cover and an effective dust guard. All these qualities are embodied in Symington Semi-Steel Journal Boxes.

They give increased journal bearing and axle mileage and long, economical service.

Specify Symington Semi-Steel Journal Boxes.

THE T. H. SYMINGTON COMPANY

New York Chicago Baltimore Boston Montreal

WORKS: ROCHESTER, N. Y.





It Lubricates Itself, Too!

Due to a recent improvement it is not now necessary to dismantle the retrievers or remove them from cars for oiling.

Our new lubricating reservoirs (patented) keeps the mainshaft properly lubricated for weeks, and can be refilled in a few seconds when necessary.

Purchased On Performance

Our No. 5B Knutson Trolley Retriever continues to be the standard retriever of so many important roads because it "made good" with them years ago and has not yet "fallen down."

Isn't that a good indication of what it can do for *your* road?

Delays due to rope breakages and damage to overhead construction will be eliminated.

Barn labor will be saved.

Maintenance costs will be reduced.

Ask us for full description and price—or, better still, let us send you a retriever on trial.

Write now.

Order One on Trial

We will gladly ship you a No. 5B Knutson Trolley Retriever for extended trial, and guarantee to refund the price if you are not convinced that it is the most efficient retriever you have ever had on your cars.

The Trolley Supply Company

MASSILLON, OHIO *Specialists*

An investment in safety which yields highest returns

"to be manufactured by the Consolidated Car Fender Co."

WHEN so specified you get The H. B. Life Guard with a long record of high efficiency with all its working parts of the best—to stand heavy service. **They are built to save life.**

The H. B. Life Guard record of life saving was attained and the guard universally adopted because it is well built, strong, efficient and positive in action.

Weaken your construction, you increase your liability! No railroad man wants to take this chance.

Specify—

H. B. LIFE GUARDS

to be manufactured by

THE CONSOLIDATED CAR FENDER CO.
Providence, Rhode Island
General Sales Agents, Wendell & MacDuffie, 110 E. 42nd St., New York



The COLUMBIA MACHINE WORKS *and* M. I. Co.

The Columbia Machine Works and Malleable Iron Company specializes in doing special jobs. You can use our shops as your own, or an auxiliary to your own shops. The following is a list of our standard products.

You might find it interesting to compare the cost of these items with the cost of any other similar articles.

AR EQUIPMENT:
- Air Brake Handles—Bronze and Malleable Iron
- Signal Bells
- Door Sheaves and Track
- Platform Foot Gongs
- Connectors, 2, 3 and 4-way
- Controller Handles, Operating and Reversing—Adjustable Types—Bronze or Malleable Iron
- Nevasplit
- Controller Parts
- Trolley Wheels, Poles and Harps
- Destination Signs—Steel
- Center Plates—Dust Proof and Oil Lubricated
- Grid-Resistors, all types
- Motor Suspension Bars

RAILWAY MOTOR PARTS:
- Armature Bearing Shells—Malleable Iron and Semi-Steel
- Armature Bearings—Bronze
- Axle Bearing Shells—Malleable Iron and Semi-Steel
- Axle Bearings—Bronze
- Armature Coils
- Armature Shafts
- Bolts—for Motors and Trucks
- Brushholder Parts
- Brushholders Complete
- Commutators—all types
- Field Coil Terminals
- Field Coils
- Gear Cases—Malleable Iron and Sheet Steel, Welded or riveted

TRUCK PARTS:
- Brake Pins
- Brake Rigging
- Coupling Pins
- Equalizers
- Gusset Plates
- Journal Boxes
- Journal Box Covers
- Journal Box Shims
- Journal Brasses
- Journal Brass Wedges
- Journal Check Plates
- Turnbuckles

CASTINGS:
- Motor and Truck Spring Cap
- All kinds of Aluminum, Brass, Bronze, Cast Steel, Grey Iron, Malleable Iron, White Metal and Zinc Castings

DROP FORGINGS:
- Light, Medium and Heavy

LINE MATERIAL:
- Feeder, Splicing and Trolley Ears

MACHINERY—REPAIR AND SHOPS:
- Armature, Bearing, Babbitting and Broaching Machines
- Armature Machine—Columbia Patent
- Armature Buggies
- Armature Lead Flattening Rolls
- Armature Shaft Straightener
- Armature Winding Stands
- Armature Coil and Taping Machine
- Axle Straightener
- Babbitting Moulds
- Banding and Heading Machine, and with Slotting Attachment
- Car Hoists—Electric
- Car Replacers
- Coil Taping Machine
- Coil Winding Machine
- Pinion Pullers and Repair Parts
- Pit Jack—Pneumatic
- Signal or Target Switches
- Tension Stands
- Freight Cars Rebuilt

COLUMBIA 18 92 MACHINE WORKS

3313 ATLANTIC AVE., BROOKLYN N. Y.



The ninth inning need not be the end of the game!

Patrons of the National sport like to see the game tied in the ninth—they get more for their money.

Boyerized Parts give you extra innings also,—many of them in fact,—for they wear from three to four times as long as ordinary untreated steel.

The Long-Life List They are BOYERIZED Parts

Brake Pins	Spring Posts
Brake Hangers	Bolster and Transom Chafing Plates
Brake Levers	McArthur Turnbuckles
Pedestal Gibs	Manganese Brake Heads
Brake Fulcrums	Manganese Truck Parts
Center Bearings	Bushings
Side Bearings	Bronze Bearings
Spring Post Bushings	

Boyerized Parts cost slightly more because they last three or four times as long as parts of ordinary untreated steel. Let us quote you on your requirements.

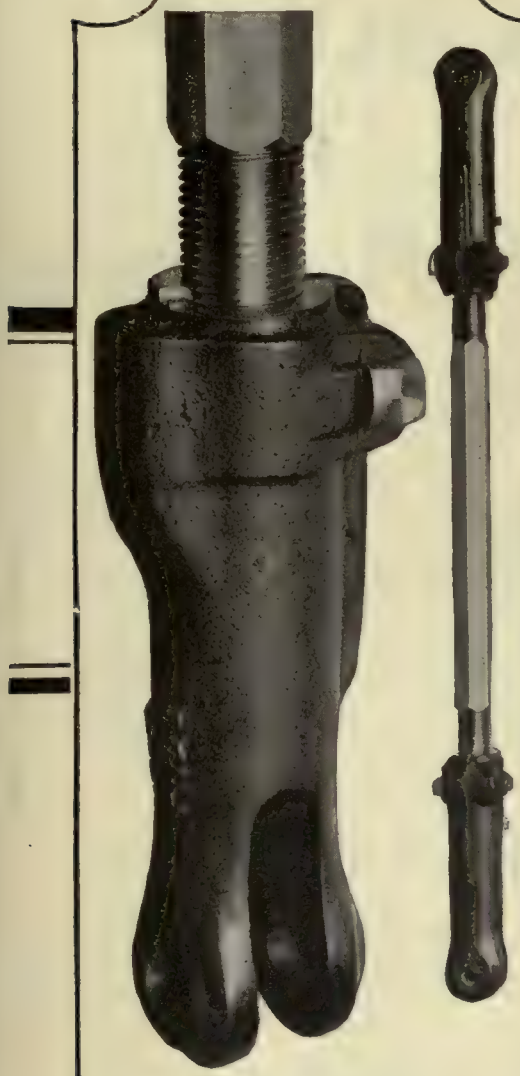
Bemis Car Truck Company

Electric Railway Supplies

SPRINGFIELD, MASS.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



Better Because It's Boyerized

The McArthur Turnbuckle

You won't have to re-fit the brake rigging with new turnbuckles, if you specify McArthur Turnbuckles in the first place. They will last as long as the truck itself.

More than that—the old style jam-nut idea has been scrapped, and an efficient spring-equipped split-clamp principle has been substituted. Now it only takes a pocket-wrench and a moment's time to make an adjustment, and tighten it up *to stay.*

Send for Sample to try.

CYPRESS

"The Wood Eternal"

gives insurance against a continuous big *labor cost* for renewals and replacements in the many railway uses for lumber.

When you specify and use

All Heart Cypress for Ties, Fencing, Trunking, Capping, etc.,

you know it will give longer service than any other material. You know, too, how labor costs exceed material costs in almost every case. Of course even Cypress may eventually have to be replaced. Nothing lasts quite "forever." But in the long service-life you get from all-heart Cypress you will have *saved* a lot of labor costs in *maintenance alone.*

Anyway, that's why a number of the biggest railways in the country *insist* on All-Heart Cypress.

S C M A

No. of Mill

TRADE MARK REG. U.S. PAT. OFFICE

"*Buy by the Cypress Arrow.*" Look for this mark on the end of every piece—or on every bundle. Our data is at your service.

Southern Cypress Mfrs.' Association

1265 Poydras Building, New Orleans, La., or
1265 Graham Bldg., Jacksonville, Fla.

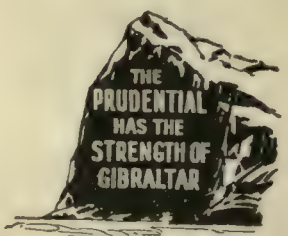
GROUP LIFE INSURANCE

What it is:

Life Insurance that covers under one policy, and at low cost, all the employees of an individual, a firm or corporation without regard to age and without medical examination.

What it does:

It enables the employer to protect *every* employee. It establishes a community of interest. It increases mutual respect and good will.



The
PRUDENTIAL
INSURANCE COMPANY OF AMERICA

EDWARD D. DUFFIELD
President

HOME OFFICE: NEWARK
New Jersey



Bates Engineers will gladly co-operate with you in your planning.

Bates Steel Pole Strength

The stability of installations built with Bates Poles as the ***backbone*** of the construction reflects the progressive trend of the organization using them.

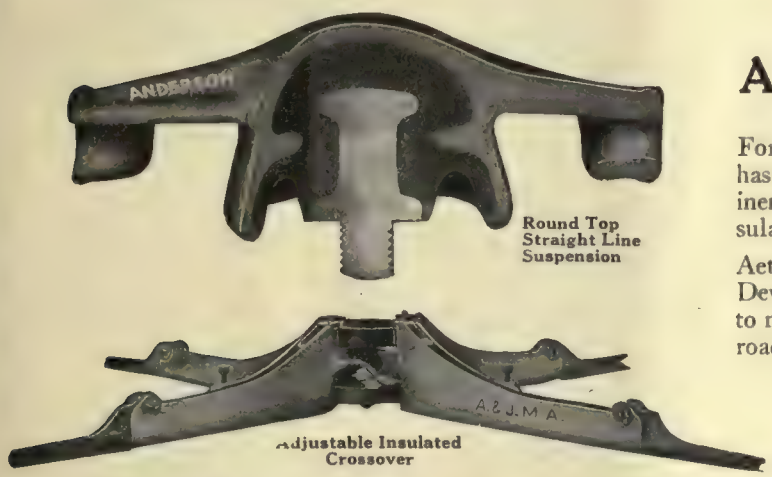
Use Bates Poles—Poles of a character consistent with the high standards you demand and specify for the rest of your equipment. Bear in mind Bates prices compare favorably with the cheapest substitutes.

Bates Expanded Steel Truss Co.

Illinois Merchants Bank Bldg.,
CHICAGO, ILLINOIS, U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

ANDERSON LINE MATERIAL



Round Top Straight Line Suspension

Adjustable Insulated Crossover

with

Aetna Insulation

For over twenty years, Anderson Line Material has been a leader in the field because of its eminently satisfactory and long service. Aetna Insulation has helped to make this reputation for it.

Aetna Insulation is our own special compound. Developed years ago, it has continued ever since to meet the exacting requirements of electric railroad line service.

—Let us send our catalog—

TRADE MARK

Reg. U. S. Pat. Off.

Albert & J. M. Anderson Mfg. Co.

Established 1877

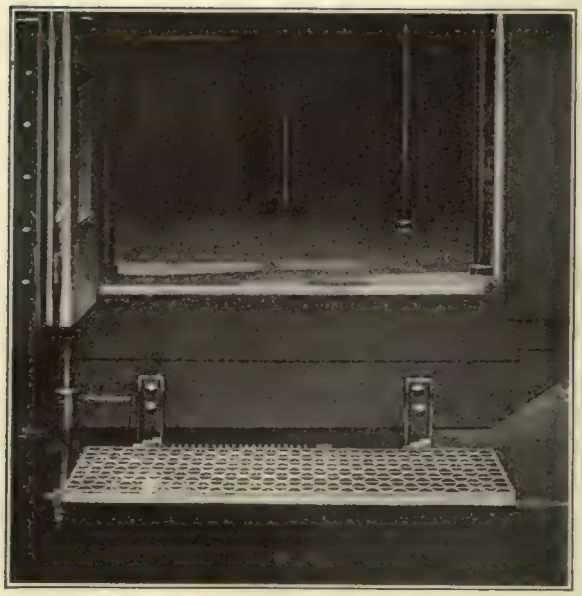
289-293 A St., Boston, Mass.

Branches—New York, 135 Broadway. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, E C. 4, 38-39 Upper Thames St.

TRADE MARK
AETNA
REGISTERED

IRVING SUBWAY TRADE MARK (PATENTED) THE FIREPROOF VENTILATING FLOORING

Safe—Year in and Year Out



IRVING SAFSTEP TRADE MARK (PATENTED) REG. U S PAT. OFF.
ABSOLUTELY NON-SLIPPING ALWAYS

Here's an all-year-round safety step—as non-slipping in winter as in summer—as safe when wet or icy as when dry. The peculiar "reticuline" arrangement of edge-on steel bars explains it. And this safe, comfortable, foot-gripping surface is an inbuilt feature of the **Safstep**—not temporarily secured by cleats or lead strips or abrasive inserts that may work loose and become a menace. Write for Catalog 3A28, giving all details.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y., U.S.A.
MANUFACTURERS OF
IRVING SUBWAY TRADE MARK (PATENTED) REG. U.S. PAT. OFF.
THE FIREPROOF VENTILATING FLOORING

LEADERSHIP QUALITY EDWARDS SERVICE SINCE 1887

IN the final analysis all of us who build cars, manufacture devices for cars and direct the operation of cars, are all tied up together in the business of serving the public.

The more success any one of us has in our work the more satisfied the public is going to be with all of us and the greater our prosperity will be.

For thirty-five years we have done our utmost to produce car fixtures for both electric and steam cars that represent the maximum in safety, convenience and economy. In this we have contributed our best efforts to the railroad business in general.

The leading railways of the country seem to appreciate this fact and show recognition of it by constantly specifying

EDWARDS FIXTURES

Edwards Products

Window fixtures
All metal sash balances
Sash locks and racks
Sash lifts
Anti-rattle compression devices
Metal stop casings and parting stops
Top, bottom and side weather stripping
Steel Vestibule trap doors
Trap door locks and latches

The O.M. EDWARDS Co. Inc. Syracuse, N.Y.

Not Just an Ordinary Splicer —But a Splicer Correctly Designed for Longer Life and Perfect Operation

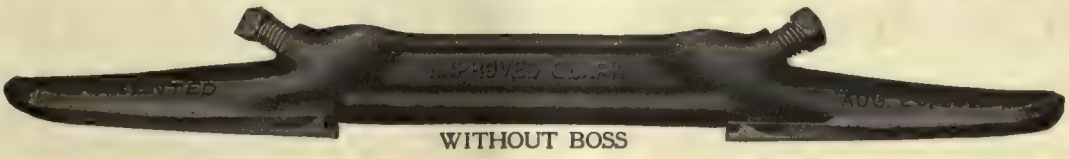


Absolutely Prevents "Notches" Where Lips Join Body

The lips of the Improved Clark Splicer have reinforcing lugs cast inside at the inner ends. When lips are peined, these lugs rest on the wire—no matter whether it is full section or worn. Lips extend lengthwise beyond lug towards center of splice and rest firmly on a shelf built into the splice body. This absolutely prevents "notches" or rough spots.

THE IMPROVED CLARK SPLICER

Eliminates Rough Spots **Insures Permanence and Smoothness**

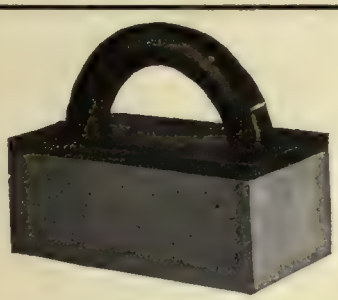


WITHOUT BOSS

The Improved Clark Splicer joins the wire permanently and presents a smooth surface for wheel, shoe or pantagraph. It is smooth under-running when first put up, actually becoming a part of the wire. The V-shaped approach carries the wheel on and off the splice without jar or vibration. These improved features eliminate arcing, pitting and excessive wear at splicer points. Furnished with or without Boss.

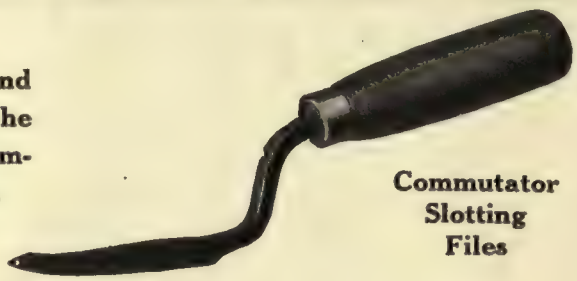
Prices sent on request

The Drew Electric & Mfg. Co., Cleveland, Ohio



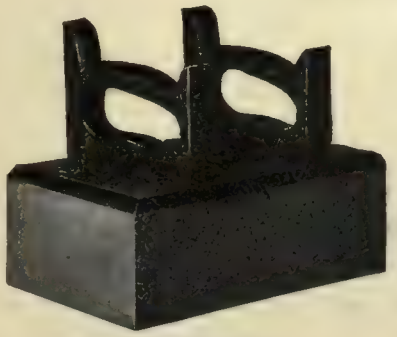
Flat-iron Handle

Send in the Coupon and get a free copy of the Carbon Brush and Commutator Trouble Chart.



Commutator Slotting Files

THE MAN WHO WINS
IS THE MAN WHO GRINS
AND MAKES ONE DOLLAR
LOOK JUST LIKE TWINS



Double Saw Handle

IMPERIAL COMMUTATOR STONES WILL PRODUCE THE GRIN

If they do not make your dollars look at least like triplets, you need not pay the invoice.

MARTINDALE ELEC. CO.

11725 Detroit Ave., Cleveland, Ohio

Gentlemen: Please send me information on your products and a copy of the trouble chart.

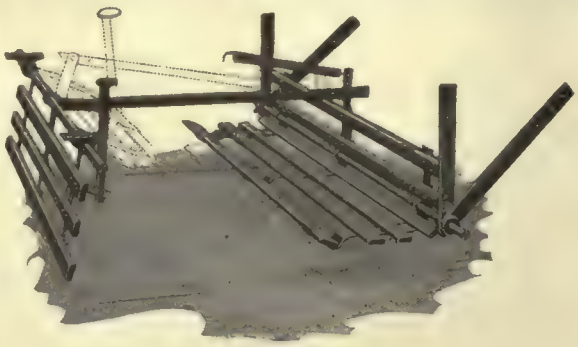
Name and Title.....
(Please Print)

Company .....

Street .....

City and State.....

Root All Spring Steel Life Guard



The guard that works perfectly

Costs no more

Abundant references gladly furnished to verify the above claims.

Play Safe! Any guard that gives unsatisfactory performance is expensive at any price.

SPECIFY ROOT ALL SPRING STEEL LIFE GUARDS on your cars

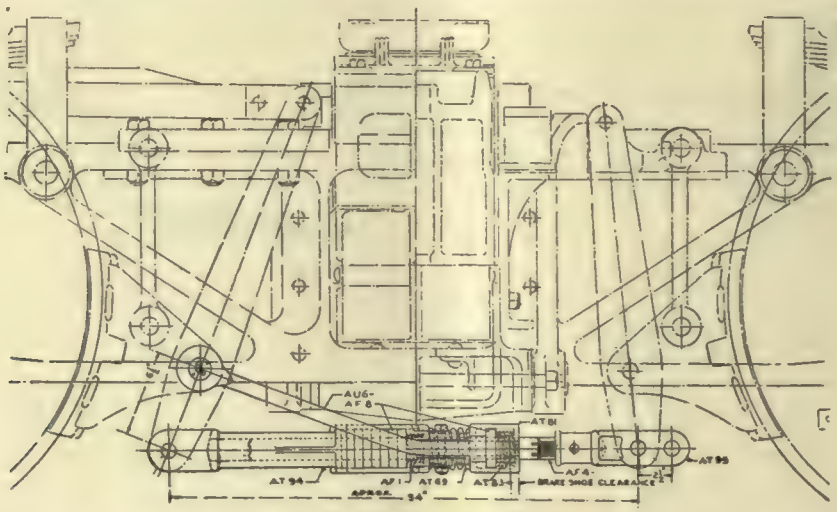
The ROOT SNOW SCRAPER has solved the problem of removing snow from the tracks and keeping the cars on time.

The scraper shown here is our No. 7 for either hand or air operation.



"It Never Fails to Clean the Rails"

ROOT SPRING SCRAPER CO., KALAMAZOO, MICH.



GOULD AUTOMATIC SLACK ADJUSTER

Give 100% Brake Efficiency.
Gould Adjusters are made to fit any truck in place of turnbuckles.
Makes your car fit to run and remain in service.
Gould Universal Slack Adjusters are becoming standard on the leading railways of this country.

Type C illustrated.

Gould engineers are pioneers in the world of *brakes, slack adjusters* and *automatic safety appliances.*

Get our figures for your new cars. We manufacture adjusters to fit any style of truck or brake rigging.

GOULD COUPLER COMPANY

30 East 42nd St., New York City **Works: Depew, N. Y.** **The Rookery, Chicago, Ill.**

10 seconds to change wheels!

BAYONET

Detachable Trolley Harps

Trolley wheel mileage can be increased and service interruptions reduced when Bayonet Trolley Harps are used. They permit removal of wheel and harp for inspection, lubrication, adjustment or repair. The change is made in a fraction of a minute—no tools needed.

With Bayonet Detachable Harps, there is no need or incentive for running a wheel which needs some minor repair. That's the kind of business which shortens the life of equipment. Bayonet Equipment helps you to prolong its life.



Wheels
Sleet Cutters
Bases with Detachable Pole Clamps

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gears and pinions.

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In Kaffir lands there is a species of xuxu (frog) many times larger than our swamp variety.

They're venomous and spit like a corn-cracker from Georgia if you get near them.

And if this spit touches the skin, it leaves a scar similar to the burn on a commutator from ill-chosen spitfire brushes.

So Mr. Native keeps away from xuxu—yet they say he's a savage.

While Mr. Operator still buys xuxu brushes—and gets in under the classification: *civilized.*

The only reason why the Morganite brush engineer can travel abroad in the land unarmed is because the xuxu brush users are much on the wane—if not *entirely* waned.

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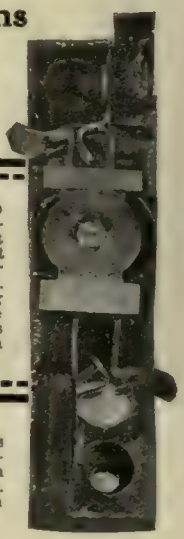
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"The Birthplace of the Safety Car"

Further particulars sent upon request



Helical Gearing



Gear Pinion
Dotted line shows tooth-form 4½° involute. Solid line shows tooth-form of Nuttall Helicals.



Rounded Teeth

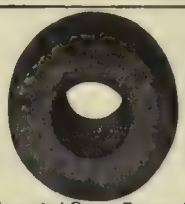
For Serious Consideration By Your Engineers

Nuttal Helical Gears and Pinions mesh much like a big nut engages the threads of a screw. There is *no* shock, no vibration, and almost no wear. This lengthens equipment life.

The tooth form of Nuttall Helical Gears is scientifically correct. There is no undercut at the tooth root where the greatest strength is required. This is another item materially increasing the life of equipment.

Nuttall Helical Gear and Pinion teeth are rounded at the ends. This facilitates installation and eliminates some troubles which occur with flat ends, due to the sharp, hard edges chipping, or their tendency to cut. This seemingly small feature has saved much time and money.

We mention a few seemingly minor features to show you how deeply and thoroughly we go into every detail which will make gears and Pinions better.



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Pinion with Ground Bore — Pinion without Ground Bore.

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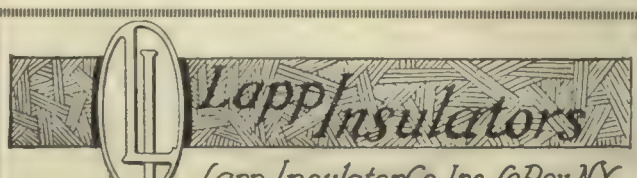


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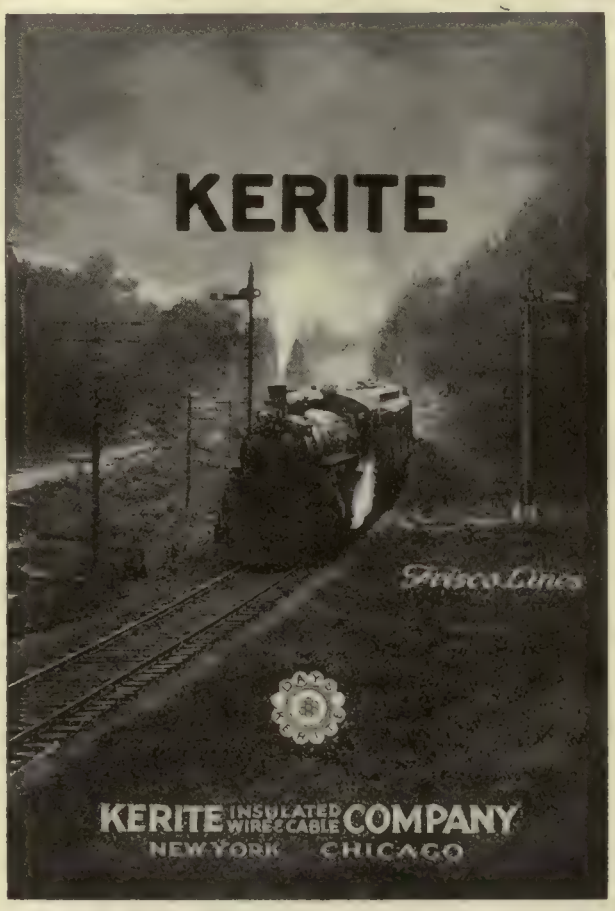


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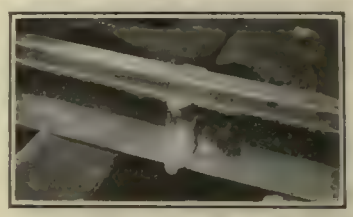
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Rail Bonds

Brazed Bonds		Arc Weld Bonds	
Type ET	head	Type AT-F	head
Type EA	of rail	Type AT-R	of rail
Type EC,	web of rail	Type AU	
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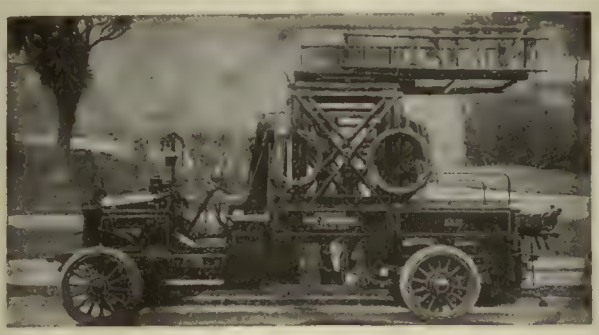
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TRUCK WITH TOWER IN RUNNING POSITION

TRENTON TOWER

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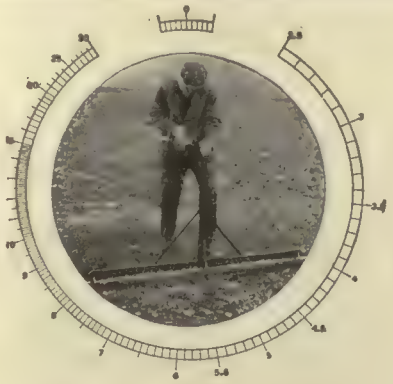
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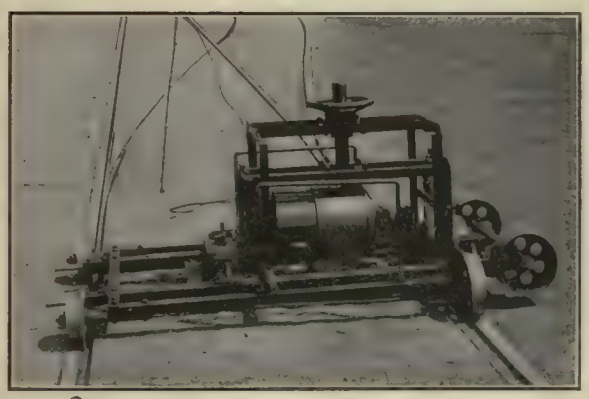
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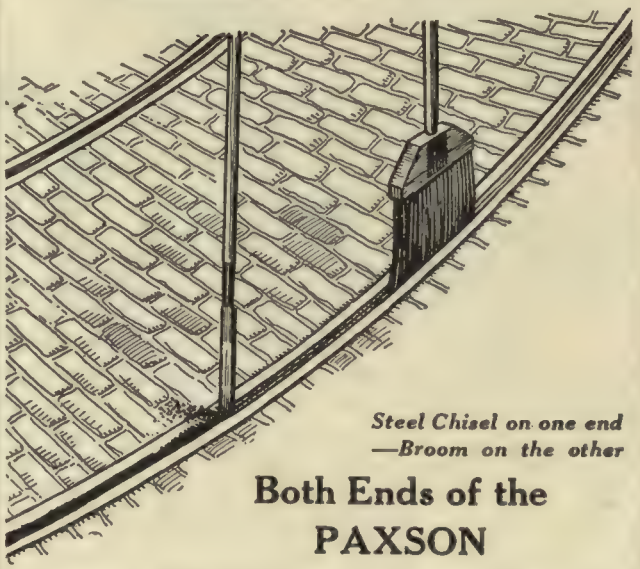
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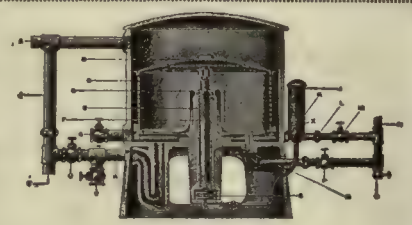
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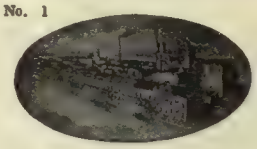
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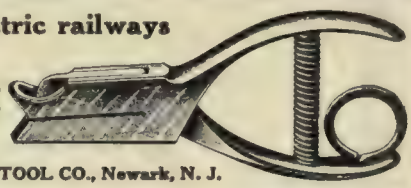
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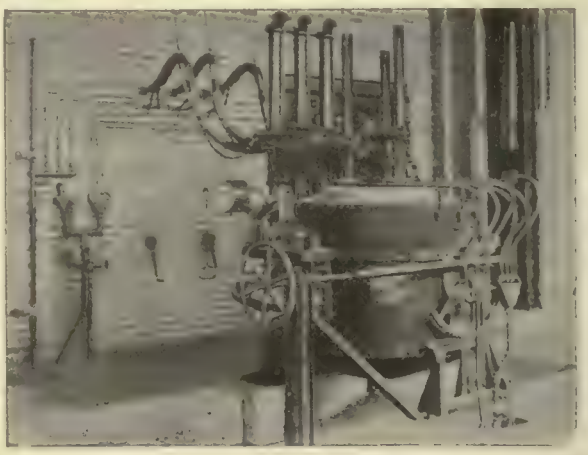
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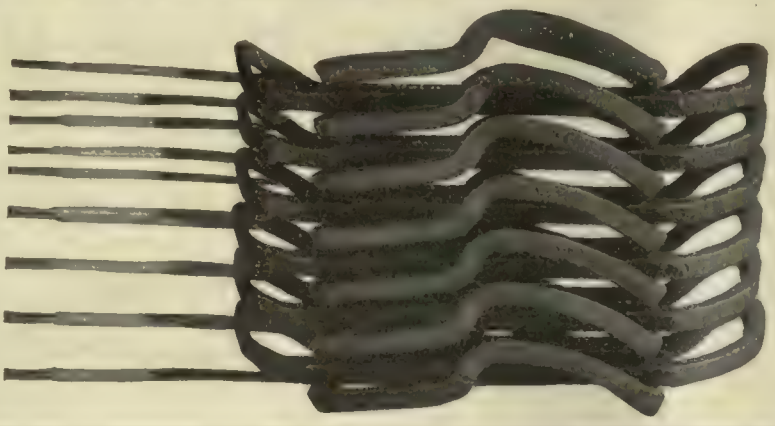
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High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

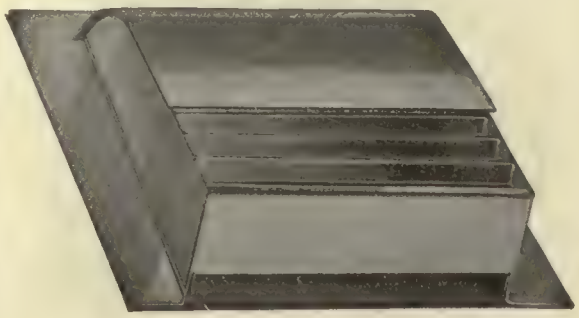
HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

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Heywood-Wakefield Co. 1415 Michigan Ave., Chicago
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
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Railway and Power Engineering Corp., Toronto and Montreal
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THE N-L New Style Type C Ventilator is absolutely weatherproof, lies low on roof, looks well and meets every requirement of ventilation.

More than seven thousand N-L Ventilators sold during 1922.

The Nichols-Lintern Company

7960 Lorain Ave., Cleveland, O.

N-L Products manufactured and sold in Canada by

Railway and Power Engineering Corporation, Ltd., 133 Eastern Avenue, Toronto, Ontario



Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois



CLEVELAND FARE BOXES

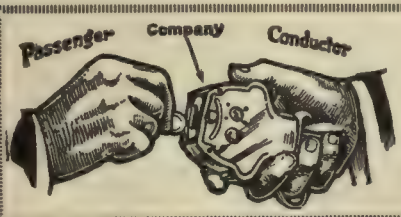
always

Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.

Cleveland, Ohio

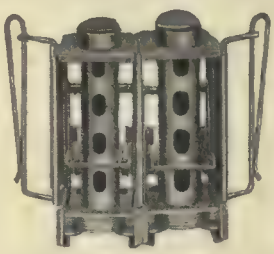
Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario



Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.
Providence, R. I.

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

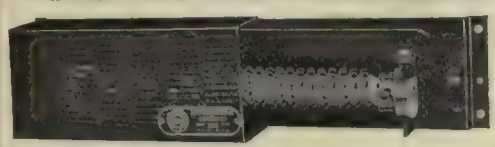
Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY

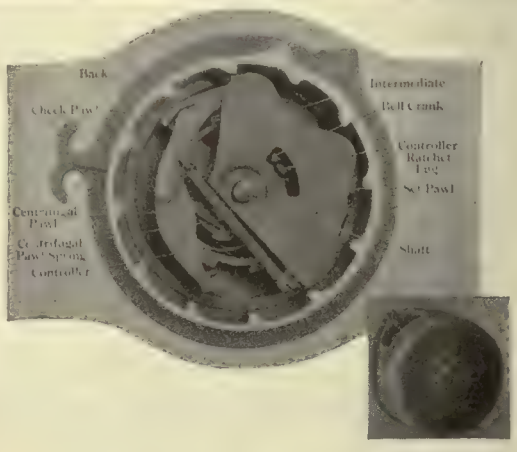
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No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



Quick, easy winding

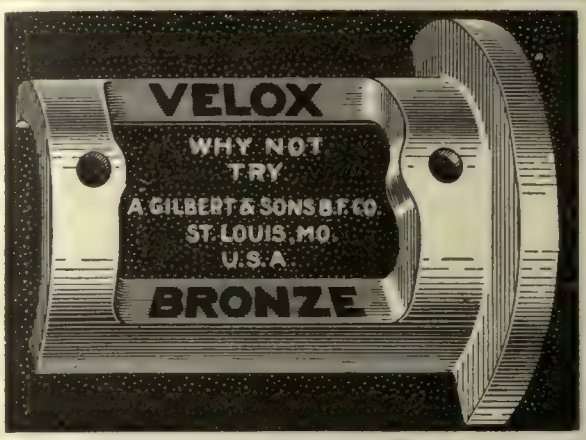
is a cardinal feature of

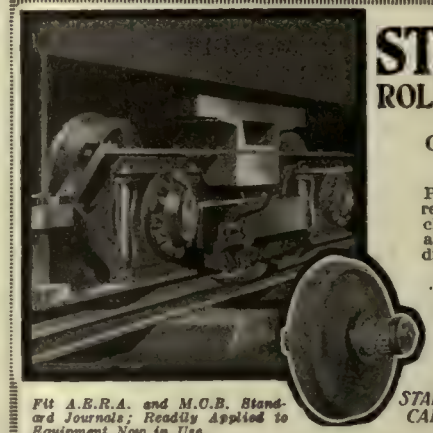
EARLL RETRIEVERS

An exclusive ratchet-wind device enables the platform man to wind the Earll with a series of short easy pulls. The ratchet holds every inch he gains. No slip. No long, time-eating pull. And that's but one of the five exclusive features that make Earll Catchers and Retrievers the first choice where they know the whole story. Do you know it?

C. D. Earll, York, Pa.

Canadian Agents:
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Cut Power Requirements in Half

Prevent hot boxes and resulting journal troubles; check end thrust and do away with all lubrication difficulties BECAUSE—

They Eliminate Journal Friction

Guaranteed Two Years

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LAWTON, MICH. U.S.A.

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RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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Samples and information gladly sent.
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Use them in your Prepayment Areas and Street Cars

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KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
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in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago

SEARCHLIGHT SECTION

POSITIONS VACANT

MAN wanted; experienced in the repair and maintenance of electric motors and controllers. Gary Street Railway, 567 Broadway, Gary, Ind.

NIGHT car barn foreman; middle west; 14 interurban, 2 Westinghouse locomotives; must be a willing worker and competent to inspect and supervise; give detail of experience, salary expected and when available in first letter. P-564, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

MANAGER or superintendent railway, light and power properties, technical, successful organizer and tactful in public relations and very resourceful in rehabilitating properties. Member A. I. E. E. Available in 30 days. PW-557, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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SUPERINTENDENT of schedules or transportation; twelve successcul years' experience on five different properties as conductor, motorman, supervisor, dispatcher, student instructor, station clerk, chief transportation clerk, and at present successfully building schedules on property operating 900 cars; guarantee to effect most economical, efficient and congenial operation of your present facilities. PW-562, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation, nine years with large city street railway property. Twenty-eight years' experience in street railway work. Eight years' experience as local freight and ticket agent steam railway. Age 50, health good; first class reference from last employer, best of reference as to character and ability. Wants position as superintendent, claim adjuster, employment superintendent, or instructor for one-man car operation, city or interurban. Address P. O. Box No. 407, Middletown, Ohio.

POSITIONS WANTED

SUPERINTENDENT of railway department, competent to take full charge. 20 years' experience in the electric railway field and hydro electric operation. PW-555, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

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2 sets Brill 27 M.C.B. E2 Trucks

Practically New.

TRANSIT EQUIPMENT CO.,
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Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control. West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
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WANTED

ELECTRIC LOCOMOTIVES

2—50 or 60 ton, 600 volt for road and switching.
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237 Railway Exchange Bldg., Chicago, Ill.

1500 Tons

85 lb. A. S. C. E. Section

Relaying Rails with Angle Bars

Immediate Shipment

Central South and Southwestern delivery

S. W. LINDHEIMER
1st National Bank Bldg.
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Rails and Track Material

FOR SALE

One Electric Railway Improvement Co.'s

Rail Bonding Car

This car is in good workable condition. Inquiries to be made of Purchasing Department.

San Diego Electric Railway Co.,
San Diego, Calif.

FOR SALE

162 Johnson Fare Boxes

Practically New.

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ACKLEY BRAKES
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The No-Staff Brake for any size and type of car

Apply the advantages of the staffless brake with its space-saving features, to all your cars. Ackley No-Staff Brakes are adaptable to any kind of service. The eccentric chain-winding drum insures quickest applications and maximum power.

Price only $32.00

ACKLEY BRAKE & SUPPLY CORPORATION
G. S. ACKLEY & COMPANY, REPRESENTATIVES
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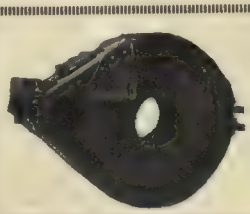
He expects more than 100,000 miles

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When you think of Steel—think of Carnegie



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One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. ***Write Us.***
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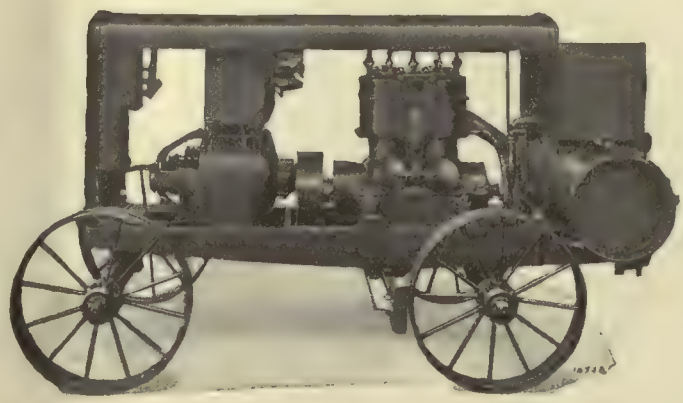
WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Circuit Breakers
Roller-Smith Co.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Ammeters
Roller-Smith Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Drew Elec. & Mfg. Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Armature Coil Equip. Co.
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Babbitt Metal
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Sup. Co.
Int. Register Co., The
Beads Insulating
Martindale Elect. Co.
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Burry Railway Supply Co.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Sup. Co.
St. Louis Car Co.
Western Electric Co.
Blowers, Portable, Motor Driven
Martindale Elect. Co.
Boilers
Babcock & Wilcox Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Railway Track-Work Co.
Western Electric Co.
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Amer. Steel & Wire Co.
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Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track Work Co.
Western Electric Co.
Westinghouse E. & M. Co.
Bond Testers
Roller-Smith Co.
Book Publishers
McGraw-Hill Book Co.
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Johns-Pratt Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Exp. Steel Tr. Co.
Drew Elec. & Mfg. Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Sup. Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Safety Car Devices Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Bridges and Buildings
American Bridge Co.
Brooms, Brushes, Etc.
Worcester Brush & Scraper Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.,
Westinghouse E. & M. Co.
Brushes, Graphite
Morganite Brush Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bus Seats
Hale & Kilburn Corp.
Heywood-Wakefield Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Cables, (See Wires and Cables)
Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes, Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
Car Lighting Fixtures
Elec. Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heati'g Co.
Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
General Electric Co.
Car Signal System
Fahnestock Elect. Co.
Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Catchers and Retrievers, Trolley
Carll, Chas. I.
Elec. Service Sup. Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Western Elect. Co.
Ceilings, Car
Pantasote Co., The
Change Carriers
Cleveland Fare Box Co.
Circuit-Breakers
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.
St. Louis Car Co.
Clusters and Sockets
General Electric Co.
Coal ad Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Armature Coil Equip. Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
Economy Electric Devices
Elliott-Thompson Elec. Co.
General Electric Co.
Rome Wire Co.
Westinghouse E. & M. Co.
Coils, Choke and Kicking
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
Commutator, Grinders
Martindale Elect. Co.
Commutator Slotters
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Hand & Motor Driven
Commutator, Slotting Equipment
Martindale Elect. Co.
Commutator Stones
Martindale Elect. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Elec. Service Sup. Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Cord Adjusters
National Vulcanized Fibre Co.
Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Cord Connectors and Couplers
Elec. Service Sup. Co.
Samson Cordage Works
Wood Co., Chas. N.
Cord, Trolley
Trolley Supply Co.
Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Culverts
Newport Culvert Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Edwards Co., Inc., The O. M.
Elec. Service Sup. Co.
Morton Mfg. Co.
Pantasote Co., The
St. Louis Car Co.
Cut-Outs
Johns-Pratt Co.
Dealer's Machinery
Elec. Equipment Co.
Foster Co., H. M.
Derailing Devices (See also Track Work)
Wharton, Jr., & Co., Wm.
Derailing Swiches, Tee Rail
Ramapo Ajax Corp.
Detective Service
Wish-Service, P. Edward
Doors & Door Fixtures
Edwards Co., Inc., The O. M.
Hale & Kilburn Corp.
St. Louis Car Co.
Door Operating Devices
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Consolidated Car Heati'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Ins.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Elec. Service Sup. Co.
Ears
Ohio Brass Co.
Electrical Wires and Cables
Amer. Electrical Works
Roebling's Sons & Co., J. A.
Western Electric Co.
Electric Grinders
Railway Track-Work Co.
Seymour Rail Grinder Co.
Electric Locomotives
St. Louis Car Co.
Electrodes, Carbon
Railway Track-Work Co.
Electrodes, Steel
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Andrew, Sangster & Co.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly, Cooke & Co.
Ong, Joe R.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Extension Platform Trapdoors
Edwards Co., Inc., The O. M.
Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Sup. Co.
Root Spring Scraper Co.
St. Louis Car Co.
Star Brass Works
Trolley Supply Co.
Fibre and Fibre Tubing
Westinghouse E. & M. Co.
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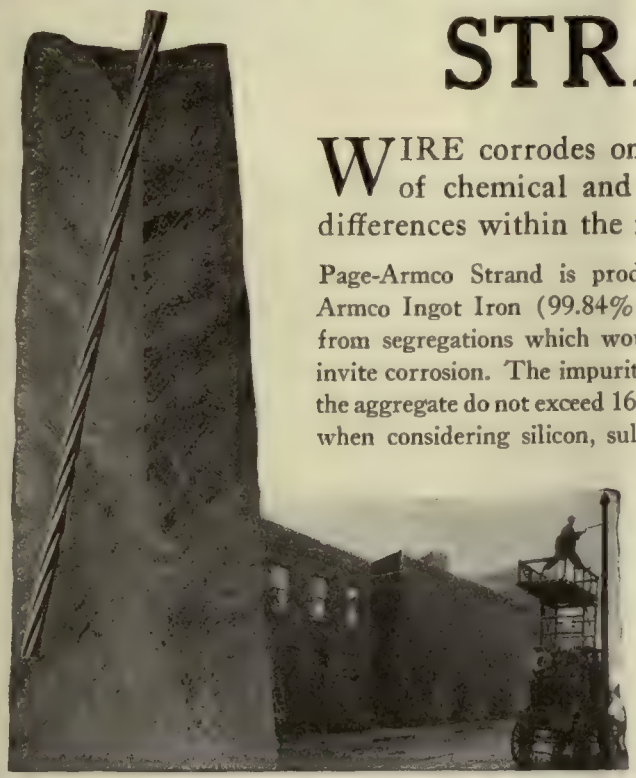
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Roebling's Sons Co., J. A.

Wire, Copper Covered Steel
Page Steel & Wire Co.

Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Kerite Ins. Wire & Cable Co.
Okonite Co.
Page Steel & Wire Co.
Roebling's Sons Co., J. A.
Rome Wire Co.
Std. Underground Cable Co.
Western Electric Co.
Westinghouse Tr. Br. Co.

Wood Preservatives
Baker Wood Preservative

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Northern **CEDAR POLES** Western

We guarantee
all grades of poles; also any butt-treating specifications

BELL LUMBER COMPANY
Minneapolis, Minn.

SAFETY TREADS

Universal Safety Tread Company
Offices in all Principal Cities
40 Court Street **Send for Catalogue RR** **Boston, Mass.**

"Make it of Vul-Cot Fibre"

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE

Another Safety Car Success



Birney Safety Cars make hit with public in Columbia, S. C.

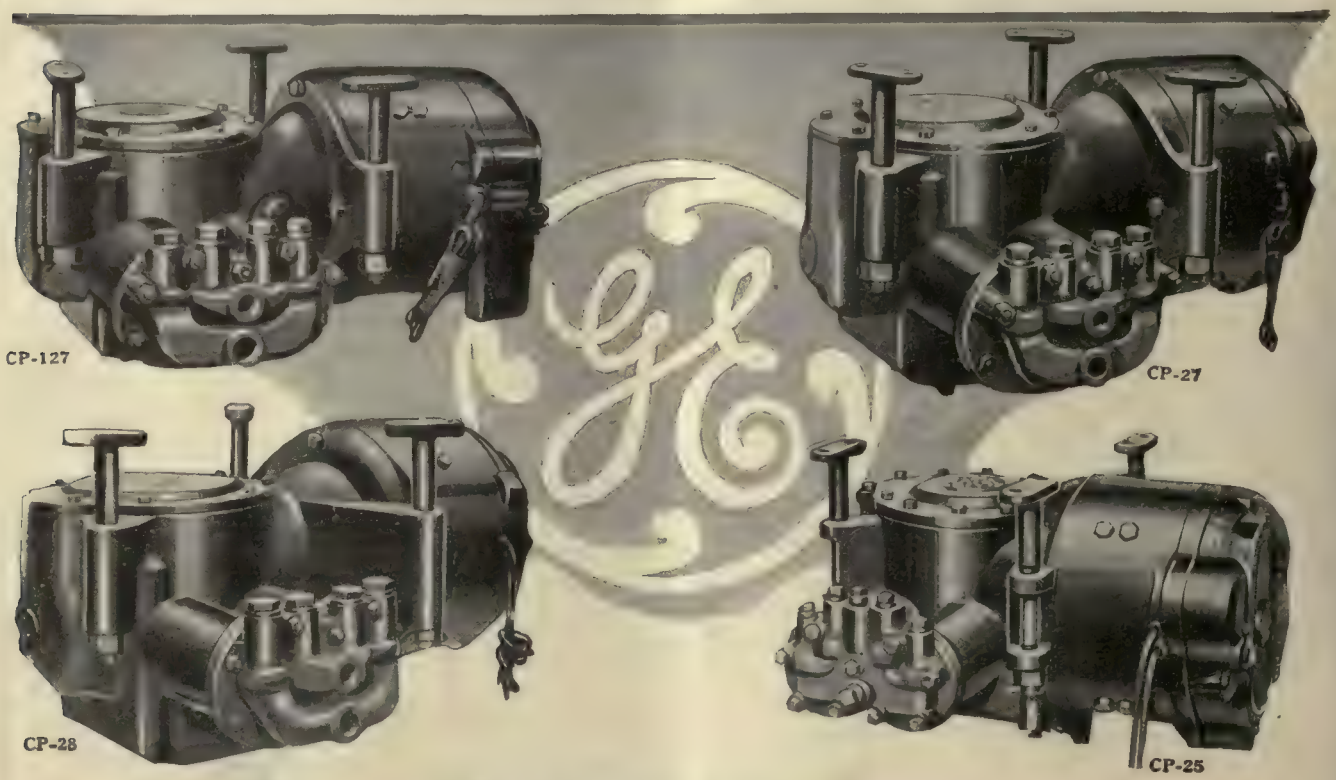
A few weeks ago the Birney Safety Car was introduced for the first time to the public in Columbia, South Carolina, and four cars of this type, built in our Philadelphia Plant, are shown above making their initial bow.

Since that time the officials of the railway have received the most gratifying reports relative to their comfortable riding, splendid appearance and general all-round suitability to the service requirements of the South Carolina capital.

Again it has been demonstrated that the light-weight Birney Safety Car is still capable of improving service and, at the same time, reducing operating expenses just as it has done for over 200 other electric railways in the United States since its introduction almost seven years ago.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

Type CP—the Low-Maintenance Compressor



These 19 Companies Wanted 1100 More

The best recommendation for any equipment is continued repeat orders. Low operating costs of CP center-gear type Air Compressors have resulted in recent repeat orders for 1133 equipments from the following companies:

	No. of cars	Type
Buffalo & Lake Erie Traction Co., Erie, Pa.	25	CP-25
Chicago Surface Lines, Chicago, Ill.	45	CP-27
Chicago Surface Lines, Chicago, Ill.	169	CP-127
City of Detroit, Detroit, Mich.	100	CP-27
City of Seattle, Seattle, Wash.	9	CP-27
Cleveland Railways, Cleveland, Ohio	100	CP-127
Conestoga Traction Co., Lancaster, Pa.	12	CP-27
Indiana Service Corp., Ft. Wayne	15	CP-27
Kentucky Traction & Terminal Co., Lexington	27	CP-25
Knoxville Power & Light Co., Knoxville, Tenn.	14	CP-25
Nashville Railway & Light Co., Nashville, Tenn.	12	CP-27
New Orleans Railway & Light Co., New Orleans, La.	100	CP-27
Oakwood Street Railway Co., Dayton, O.	12	CP-27
Philadelphia Rapid Transit Co., Philadelphia, Pa.	201	CP-27
Public Service Railway, Newark, N. J.	110	CP-27
Pennsylvania-Ohio Electric Co., Youngstown, O.	12	CP-27
San Francisco-Oakland Terminal Ry., Oakland, Cal.	55	CP-27
Terre Haute Traction & Light Co., Terre Haute, Ind.	10	CP-25
United Traction Company, Albany, N. Y.	55	CP-27
Virginia Railway & Power Company, Richmond.	50	CP-27

General Electric Company
Schenectady, N. Y.

GENERAL ELECTRIC

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ELECTRIC RAILWAY JOURNAL

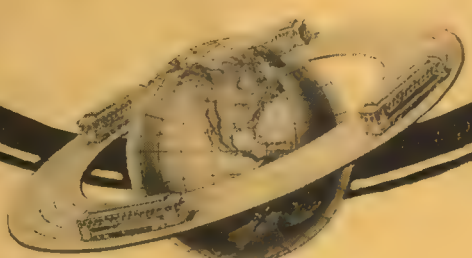
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YCEUM AND



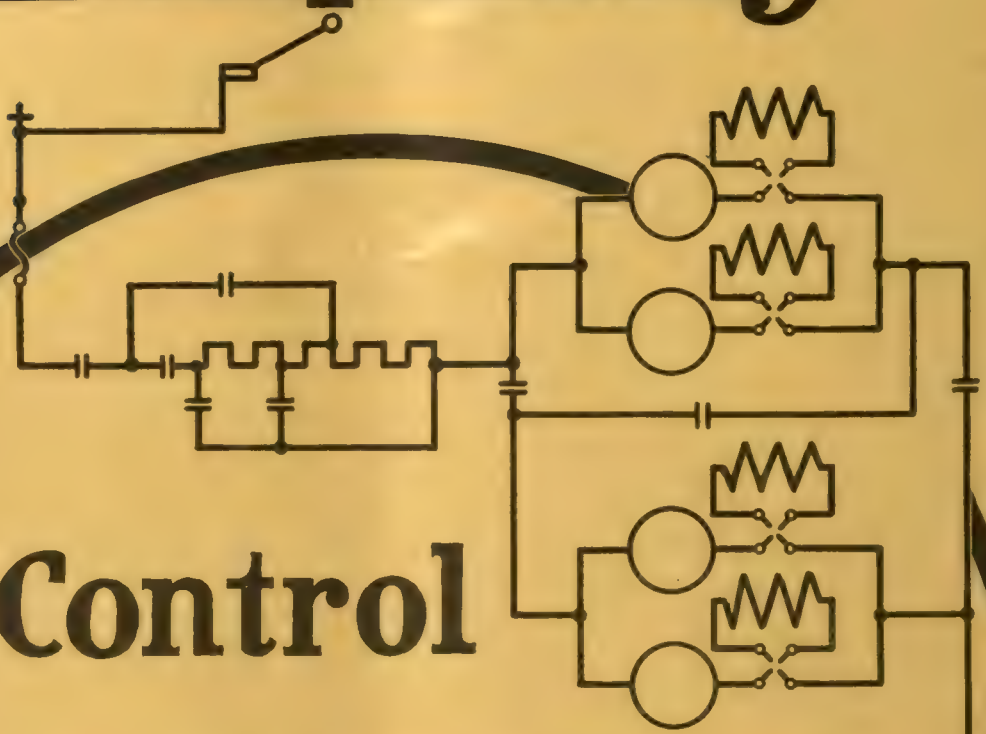
Choose well

By entrusting the disposal of your car card space to Barron G. Collier, Inc., you are assured that this earning asset of your company will receive the attention of a nation-wide organization and the benefit of the services of the most competent men operating in this specialized field of advertising—qualifications which are essential to a successful use of the space.

Barron G. Collier, Inc.
Candler Building, New York



Simplicity



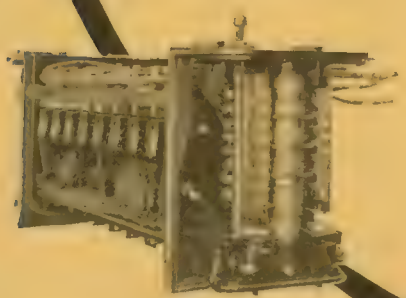
HL Control

The Recognized Standard for Fifteen Years

During this period it has rendered a real service to the Electric Railway Industry.

Years of successful operation on more than 250 properties are a measure of its superiority.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



No. 480 Group



No. 806 Group

Westinghouse

Vol. 61, No. 25 **New York, June 23, 1923** *Pages 1031-1070*

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The Index

Next Week

NEXT week's issue of ELECTRIC RAILWAY JOURNAL will contain the complete index to Volume 61, covering the first six months of 1923. The index will give references to every article appearing in the JOURNAL during this time, classified by subjects as well as by geographical location. There is a separate author index and a list of personals. Altogether between 3,000 and 4,000 entries or cross references are included.

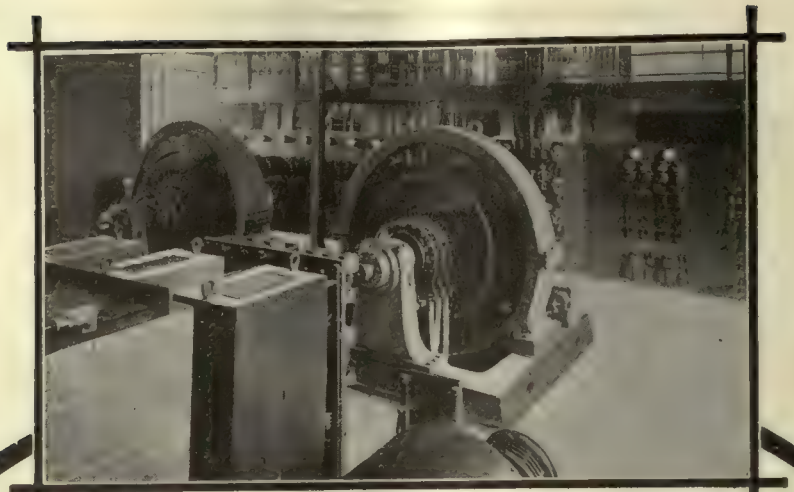
The publishers of ELECTRIC RAILWAY JOURNAL have for many years followed the same consistent policy of giving such careful attention to the form in which the references are listed that only a minimum of effort is needed to locate a desired subject.

To make it still easier for the reader unfamiliar with the system of indexing, instructions are printed at the beginning of the index explaining not only the method adopted but giving a list of keywords to assist in locating information.

If you want to get the most good from the service the JOURNAL is furnishing be sure to look out for the index next week and then preserve it where it will be readily available when you want information about any electric railway subject. The index is always bound in the front of the last issues of June and December. When having your volumes bound be sure to place the index in the front of the volume, where it is most convenient for use and where it serves also as a title page.

Circulation of this issue, 5,900

Advertising Index—Alphabetical, 42; Classified, 38-40; Searchlight Section, 37



"Heights" Station in service since December 15, 1920.

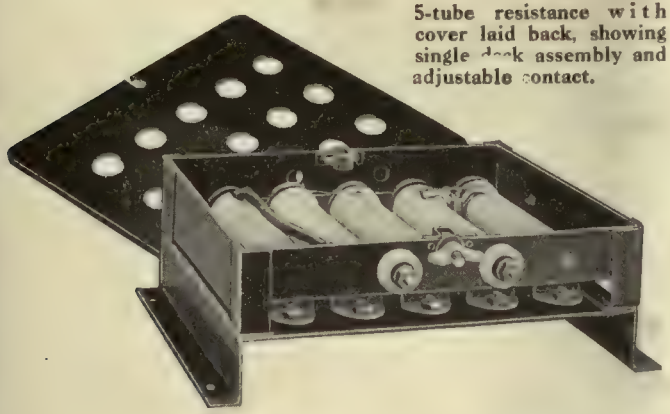
THE CLEVELAND RAILWAY COMPANY
operates the largest automatic substation system in the world.

The "Pioneer User" of automatic substation equipment in metropolitan service recently placed an order for four Two Unit 3000 Kilowatt Automatic Substations and Apparatus to complete two single unit stations.

This will make a total of nine stations, aggregating 24,000 kilowatts and constituting the most comprehensive installation of automatically controlled railway substation equipment in existence.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

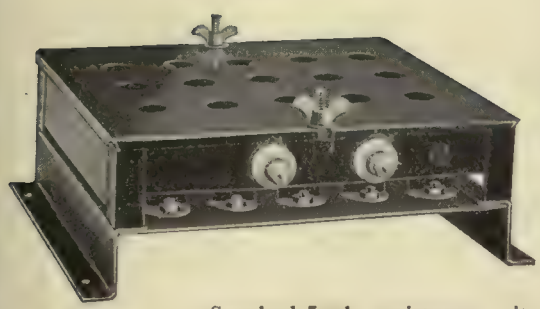
Westinghouse



5-tube resistance with cover laid back, showing single deck assembly and adjustable contact.



Improved Resistances for Imperial Arc or Incandescent Headlights—



Standard 5-tube resistance as it appears ready for accessible installation.

Crouse-Hinds Imperial Headlights are sold exclusively by the Ohio Brass Company.

The improved, compact, lightweight resistance boxes for use with Crouse-Hinds Arc or Incandescent Headlights embody distinctive features for simplified and accessible installation and for exact adjustment to voltage conditions. They are not just "coil boxes." They are specialized designs for main and dimming service.

1st—Regardless of the number in a box, the coils are always laid in a single deck or row. This gives better ventilation and makes the individual elements more accessible.

2nd—Adjustable barriers or sliding contacts (shown in cut at top of page) are provided for accurate adjustment of the resistance to meet arc or lamp filament current requirements. Resistance can be cut in or out of the circuit accurately and current set for maximum efficiency.

3rd—Each coil of resistance wire is removable independent of the others.

4th—Resistance wire is the best that can be obtained. It will not rust or corrode, nor is it affected by moisture. It will withstand very high temperature without oxidizing, scaling or becoming brittle.

5th—The resistance wire is wound on threaded, hollow porcelain tubes. Adjacent turns of wire cannot touch and short circuit. The wire can be exposed to the air for ventilation since it is non-corrosive.

The Improved Resistances are worthy associates for Imperial Headlights. Both are fully described in special headlight catalog, sent on request.

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus Marsh & McLennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & McLENNAN

175 W. Jackson Blvd. Chicago, Ill.

Minneapolis
New York
Detroit

Denver
Duluth
Columbus

San Francisco
Seattle
Cleveland

Winnipeg
Montreal
London



Where the Track Dollar Goes!

(Note:—Percentage figures from an estimate to base of rail based on wood ties on six inches of concrete.)





Re-orders are nearly 86% of our 1923 first half business because first orders average smaller than re-orders — for only after trial do we expect, or get, all of our customers track reconstruction program. This pleases us, for it confirms our high opinion of Steel Twin Tie Track.

Steel Tie Construction Reduces the Investment in Idle Material

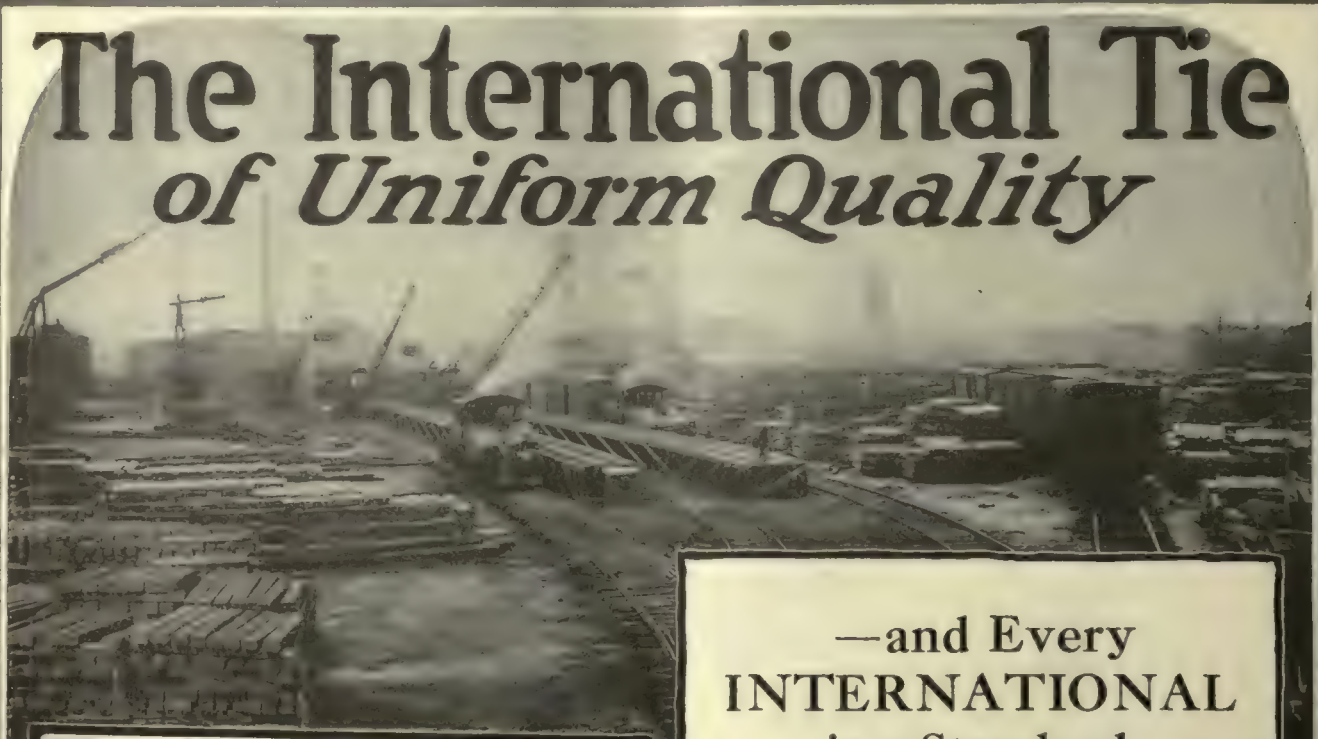
You call it *building track!* Yet a large part of your cost is for a smoothly paved space for other traffic. Usually this paving is supported by a concrete foundation, no part of which carries any of your track load—if you use wood ties.

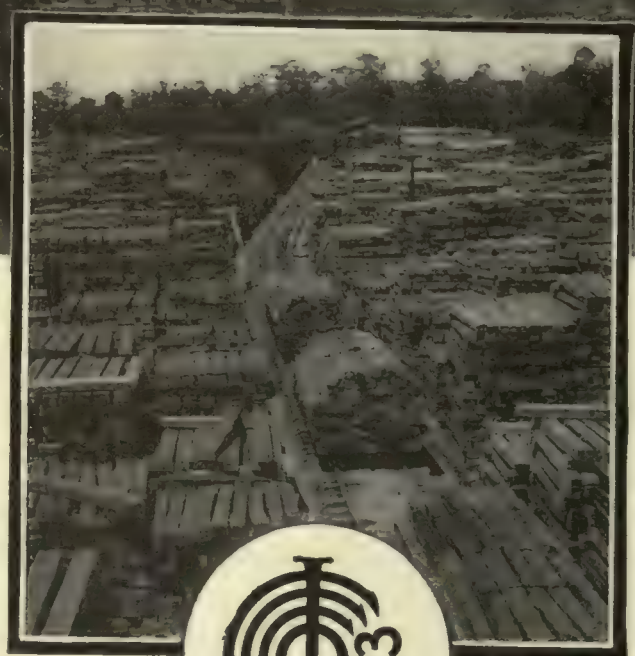
Twin Tie Track is the economic remedy for just that condition. No matter what rail you use the bottom of a Twin Tie is six inches nearer the street grade than a wood tie. Labor, excavation and amount of concrete are reduced; the latter is reinforced; the bearing on both concrete and subgrade is increased and, as users will testify, the finished job has longer life and better riding qualities than any other construction. Note that initial orders are smaller than re-orders (at left) and why. Start investigating Steel Tie Construction today!

THE INTERNATIONAL STEEL TIE CO.
Cleveland

Steel Twin Tie Track

The International Tie
of Uniform Quality





The Stamp of Quality
The International Dating Nail

—and Every INTERNATIONAL is a Standard Specification Tie

THERE is a vast difference between the mere purchase of ties and really investing in Tie Service—when you specify International you get both—because every International Tie is a sound, well seasoned, thoroughly treated, standard specification tie.

To substantiate our willingness to assume full responsibility for our ties—every International Tie is permanently marked with the I. C. C. Co. Dating Nail. This identification is particularly important to the tie consumer because the real value of high grade timber and effective penetration of International Treatment can only be realized after many years.

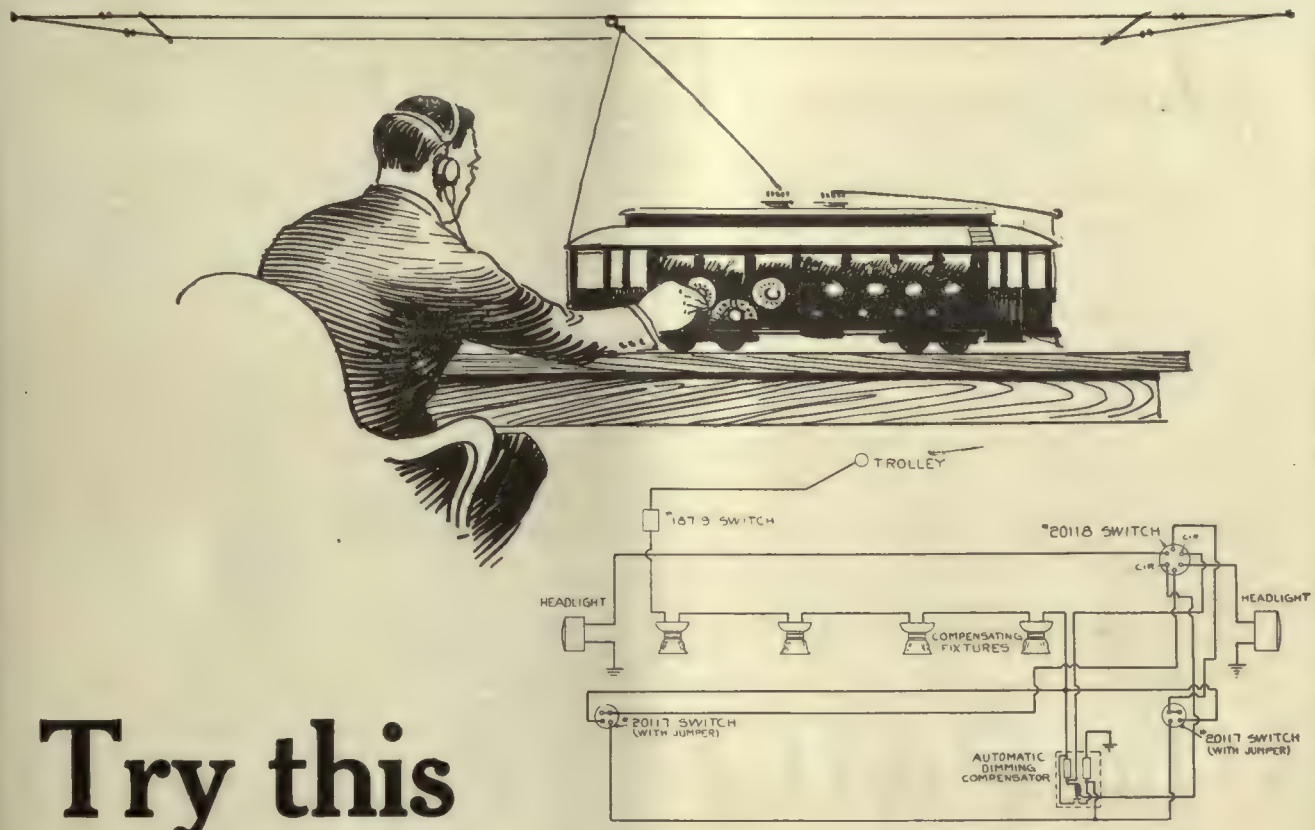
The scientific application of correct principles, together with 30 years of successful experience in the preservation of timber prompts us to trademark our ties permanently. We want you to identify the ties and check for yourself the remarkable service International Ties render.

Just specify the timber, the grade and the treatment desired—we will ship the ties exactly as you specify them.

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas



Try this Hook-up

List of Keystone Specialties required per car

2—Golden Glow headlights
1—Automatic compensator dimmer
4—Compensator lighting fixture
2—"Bright" and "Dim" switches
1—DP, DT switches

Diagram shows wiring connections for double end car with two headlights, either headlight operating in series with one circuit of interior car lights, equipped with compensating fixtures including switches for operating opposite headlight and using type USA automatic compensating-dimming resistance.

This makes a single, fully compensated circuit which provides interior car lighting and headlight and permits the dimming of headlight without affecting car light.



ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

BOSTON
88 Broad St.

NEW YORK
50 Church St.

PITTSBURGH
829 Oliver Building

CHICAGO
Monadnock Bldg.

SCRANTON
316 N. Washington Ave.

Canadian Distributors:
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

The Genuine!

There is only one "Guaranteed Penetration Process" - its "the P & H". It guarantees- in writing - a **full one half inch** uniform penetration throughout the ground line area.

A written guarantee goes with every shipment of "P & H Guaranteed Penetration Process" poles agreeing to refund the butt-treating price on any pole that does not have the full specified half-inch penetration.

The "P & H" *Guaranteed Penetration Process*

gives you absolutely certain results no guesswork. For the most reliable pole service - for the longest pole life - insist on the genuine "P & H"

We can fill any pole needs - for Butt-Treated and untreated Northern White and Western Red Cedar poles - or for any form of Butt-Treatment.

Prompt Shipment assured by the convenient location of our yards in the North Central and Western States.

Our interesting folder on the Butt-Treatment of cedar poles will tell you the why and wherefor of the "P & H Guaranteed Penetration Process." Write for a copy.

Copyright, 1922 by P & H Co.



"P & H" Guaranteed Penetration Process Poles in lines of Chicago, North Shore and Milwaukee R. R.

PAGE AND HILL CO.

MINNEAPOLIS, MINN.

Grand Rapids, Mich., Powers Bldg.

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For folding doors or sliding ones

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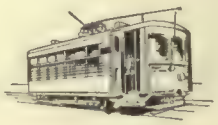
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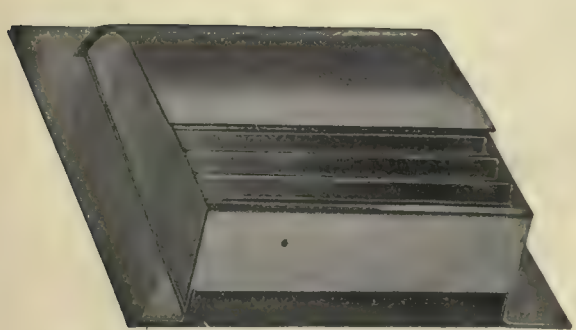
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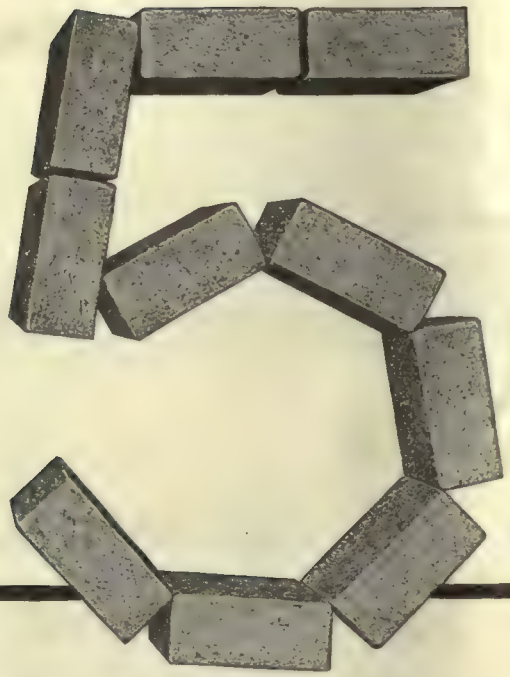
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New York, Saturday, June 23, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61
Number 25

Maintenance of Men as Well as Maintenance of Plant to Be Considered

PROBLEMS of maintenance usually are confined to the material features of the railway's equipment; but another element that merits careful consideration was again brought to the attention of the industry in the address of Dr. Alden Coffey before the street and interurban section of the Southwestern Public Service Association, abstracted in this week's issue.

Good maintenance, and in fact good work in any department, requires good health of the individual. It is entirely a personal problem, and each case must be handled on its own merits. The best way to have good health is to educate the employee to pay personal attention to it. But a railway needs to start right by employing only those men who can pass a suitable physical examination. Then periodic examinations will reveal any changes for better or worse in the well-being of each employee.

The writer points out that conservation of health should apply not only to the workman, but to all in the employ of the company from the top down. The value of this is obvious, since a man cannot give the best attention to the problems at hand if he is sick. He is more likely to be hard to do business with, and this reacts on those who must work with him.

Numerous direct financial savings are cited in favor of the plan, such as reduced turnover of labor, since those who are hired have a greater chance of remaining at work. These results also reduced compensation for accidents. Incidental advantages come in better relations between motormen and conductors and the public. When it is remembered that the trainmen are the company's principal salesmen, the importance of having them present the best appearance and greatest show of cheerfulness is evident.

Stored Cars Constitute Large Fire Hazard

THE greatest fire risk on an electric railway, because representing the greatest aggregation in inflammable material, is usually the carhouse. Several times a year it is demonstrated that a carhouse full of rolling stock furnishes ideal conditions for a conflagration that quickly gets beyond control and consequently wipes out the structure and reduces the contents to a tangled mass of scrap. Many steel cars include considerable inflammable material in their construction. Hence even though isolated, each car itself is a considerable fire hazard. But when a large number of cars are within an inclosure, which confines the flames, and close to other inflammable material, such as wood, oil, paint and waste, a condition is produced which is extremely favorable to the rapid spreading of a fire.

Unfortunately also there are conditions in and around carhouses and shops such as bare 600-volt conductors that are favorable to the starting of fires. These facts are not mentioned because they are new. But, as a recent article in this paper showed that a number of companies are favoring inside over outside storage for cars, the matter of carhouse fire risk remains a live topic. Though probably more progress has been made in intelligent protection against the fire hazard during the past five years than during any previous decade, more remains to be done.

One of the most disastrous carhouse fires within the last two years was that of the Devon carhouse of the Chicago Surface Lines on Jan. 26, 1922. This case illustrates how rapidly such a fire spreads and how complete is the destruction. Ninety cars were destroyed in this fire, which wiped out one-half of the structure. Although the Devon carhouse fire was spectacular because of the large number of cars lost, it is but one example of many that might be cited to show how rapid is the spread of fire in the average carhouse, which is often the case in spite of what is usually considered adequate fire protection.

Besides the monetary loss from the destruction of cars, which may be covered by insurance, there is another loss which may be nearly as large as the value of the car, but is usually not considered a subject for insurance. This is the loss in revenue because of the lack of cars until those burned have been replaced. This emphasizes the need for the adoption of all practicable safeguards against the fire loss of any considerable number of cars.

Customer Ownership Is an Excellent Means of Improving Public Relations

WE ALL want good service, and most of us are willing to pay what we think a fair price for it; but how many of us know what some of the seemingly minor demands made of the utilities mean in the matter of expense? So long as the other fellow has to foot the bills we do not care, provided the service continues as we normally expect it to. The only time it is realized that there is something wrong is when the service deteriorates and the utility asks for more revenue in order to put the quality back where it should be. Even then the usual thought is that the corporation can find the money somewhere or else cut off some of the always "excessive dividends."

Several speakers at the recent convention of the National Electric Light Association emphasized the value of customer ownership in developing better public relations. The problems involved in providing satisfactory utility service, while at the same time earning a reasonable return on the investment, are then brought home to the customers.

Make the customer an owner of the property, keep him informed constantly through financial statements and other timely material addressed to him as a stock-

holder, and then let him know that the attacks made by demagogues are attacks against *his* business, and are likely to jeopardize *his* investment, and there will not be so much enthusiasm for the corporation baiter, whether it be politician or newspaper.

One phase of the matter must not be overlooked, however. The customer will not stand for poor service just because he may be a stockholder. It is not likely to be a major investment with him, and when the poor service becomes apparent he forgets his partnership and complains as any ordinary customer. Of course, no management should be misled into thinking that poor service ever pays, whether or not the customers participate in the profits. However, it is important to keep quality of service close in mind, for a few instances of notably poor service may undo much of the work of a long and carefully-planned ownership campaign. In other words, make the service such that the partners can be proud of their interest in the enterprise, not ashamed of it, among the circle of friends in which they are going to take the part of the utility.

Furthermore, customer ownership challenges utility executives to be very conservative in the extent of their financing, lest over-capitalization result in failure to earn dividends and the reverse of the expected advantage from customer ownership.

Benefits of Surface Car Subways Not All for Electric Railways

RECENTLY there was a discussion in this column on the cost of subway construction for surface cars, in which it was pointed out that surface car subways are not an economic advantage to the electric railways using them. What, then, is the argument in favor of this form of construction? Repeatedly it has been urged that the street cars should be taken off the streets to reduce traffic congestion, as though the street cars are the primary cause of the congestion.

While street cars, or any other vehicles in the streets, are a cause of congestion, they do not compare with some other users of the streets. Daniel L. Turner, in his report to the New York Transit Commission abstracted in this paper on June 9, states that touring cars take up in our congested streets nine to thirteen times as much space per passenger carried as the most economical street car. Taxicabs, he says, are still worse. His conclusion is that it is such extravagant users of the streets that cause the difficult traffic conditions.

If the street cars are taken off the streets, instead of providing a true relief of congestion, the result is to give up more space to the less efficient passenger vehicles. The street car rider, who, by virtue of his number, has the logical right to the street space, is inconvenienced by having to walk, sometimes several blocks, to a subway station in order to get his car. If he has been accustomed to take a short ride in the district where the cars have been put underground, the chances are that he will walk the entire distance rather than go to the trouble of walking a good share of the way to a station and then climbing down and up stairs in the bargain.

In return for this inconvenience to the greatest users of the streets, they have the privilege of paying more for their car rides, either in increased fares or increased taxes, while the beneficiaries frequently demand, and sometimes get, added free garage facilities in the form of additional parking space on portions of the streets vacated by the railway.

It is about time for the public to wake up to this condition. It is no more logical to put the street cars off the streets than to do the same thing with automobiles and taxicabs. One main reason that subways are proposed for the railway rather than for these other vehicles, is that with the latter there is no convenient corporation that can be made the collector of the tax on the public necessary to finance the proposition.

Why not put the matter before the public in this light and then see if the citizens will be so enthusiastic about a public improvement of this character? It is another matter of education.

Is Enough Thought Given to the Comfort of Passengers?

WHEN street railways were younger and were fighting actively to obtain business a great deal of attention was paid to the little details that distinguish comfort from purely utilitarian purposes. As the demand for local transportation became better established passengers came naturally to the street cars and less attention was paid to methods of inducing people to ride.

When the era of increasing costs arrived many managers considered it advisable, among other economies, to eliminate certain refinements which made for comfort. Cane seats replaced the earlier upholstered seats, and finally in some instances these gave way to wooden slat seats. The spacing between seats has often been reduced so as to take care of more passengers, but the knee room has become uncomfortably small for tall persons. On some roads the once familiar cross seats gave way to the longitudinal type, despite the very clear public disapproval of side seats, for the reason that the railway man saw in this change a means to give the same seating capacity while permitting of a greater standing load in addition. The old-fashioned open car, although an accident breeder and requiring duplicate equipment, was liked by the public on account of the view obtained and the fresh air. This, too, is passing away, no new orders for this type having been placed for several years.

Changes such as these have followed one after another, until in many cities, even apart from the influence of the automobile on the kind of transportation comfort demanded, it scarcely can be said that riding in the street cars is a diversion to be indulged in for the pleasure of it.

In contrast to this, it is interesting to note that recently the London Underground system has been making experiments with various types of car, whose major differences appear to the public to be in the interior decoration and in the quietness. Another indication of the same thought is the use of plush-covered seats in safety cars of the North Shore Line used in Milwaukee. These innovations are made primarily to attract business.

If cars equipped with features of this sort for comfort of the passengers perform in other respects as well as the cars not so arranged, there can be no question but that additional traffic can be attracted. Whether the amount of this business is sufficient to justify the increased expense of maintenance is another matter. These two companies, at least, think the idea is well worth trying.



The Three-Door Arrangement Speeds Up Movement of Passengers

Three-Door Trailers in Toronto

Operated on the Pay-as-You-Pass Plan and Have Three Doors, of Which One Can Be Changed by the Conductor from Entrance to Exit—Run in Conjunction with Peter Witt Motor Cars—A Fast Schedule Is Made

THE traffic on Yonge Street, Toronto, and on some other streets in that city is very heavy during rush hours, so much so that trailers are used, attached to the Peter Witt motor cars during the busy morning and evening hours. Since it took over the street railway system in September, 1921, the city has added 450 cars to its rolling stock equipment. In 1921-22 it purchased 190 motor cars and 60 trailers and in 1922-23 100 motor cars and 100 trailers were added.

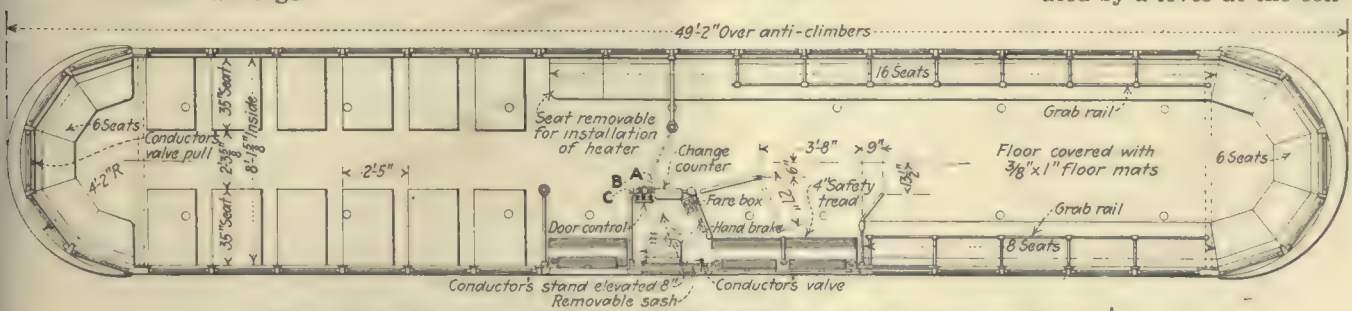
All of the trail cars are center-entrance, but in the last 100 trailers added there are three side doors instead of two, to increase their loading and unloading capacities. With the wide doors of the Peter Witt motor cars it is possible for two streams of passengers to enter and two to leave the car at the same time, and as motor car and trail car have equal carrying capacity it was found desirable to have the entrance and exit capacities of the trailer the same as those of the motor car to prevent a slowing up of running time.

This is accomplished by the three-door arrangement. In this arrangement the door to the rear in the trailer is always used as an exit, while the door nearest to the front is always an entrance. The center door, on the right of the conductor's stand, may be used either as an entrance or as an exit, but not as both at the same time. It is changed from one to the other by the conductor, who alters the position of a movable barrier as the character of the traffic demands.

When the trailer is inbound during the morning rush period the two front doors are used as an entrance and accommodate two streams of passengers, the barrier being set so that passengers turn slightly to the right as they enter at either door. When the trailer reaches the central or unloading zone on its in-bound trip the barrier is altered so that passengers from the forward, or unpaid section of the car, may deposit their fare and leave at the door to the conductor's right without conflicting or causing aisle interference with the passengers leaving from the paid, or rear, section of the car, who use the door to the conductor's left. The movable barrier is operated by a lever at the con-



Center Well, Stanchions and Swinging Barrier, Grab Rail Over Longitudinal Seats, and Slat Seats



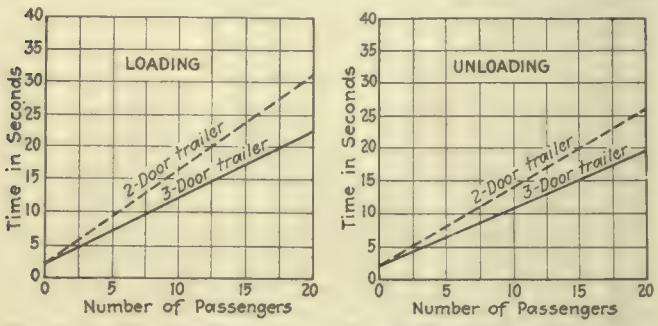
Plan of Three-Door Toronto Trailer, Showing Swinging Barrier for Center Door

ductor's left. The doors are each equipped with a door engine, and the valves controlling the engines are located in the conductor's stand. The three valve handles are placed so that it is as convenient for the conductor to operate one or three, or any two of them, as conditions warrant.

The trailer doors are interlocked with the motor car control, and a light is being installed at the conductor's stand, which will burn when the entrance doors of the motor car are open. It is considered that this signal will assist in speeding up the service.

Since the fall of 1921, the Toronto Transportation Commission has operated sixty trailers which have a single entrance door to the conductor's right and a single exit door to the conductor's left. The first of the 100 new three-door trailers went into service on Feb. 26, 1923, and all are now in operation.

Two charts are published on this page, one showing loading time and the other showing unloading time for the two types of trailers. These charts are based



The Charts Show the Reduction of Time in Loading and Unloading for the Three-Door Trailer

on about 600 observations with each type of trailer, but the data were produced after the three-door type had been in operation only a short time. It is expected that the new equipment will show still further savings in loading and unloading time as passengers and conductors familiarize themselves with it.

The cars are not supplied with hand straps, but the end of the car with longitudinal seats has a grab rail on each side, as shown in the accompanying plan. This grab rail is at the height of the usual strap handle, or about 5 ft. 10 in. The upper window sash in this car is deeper than usual to permit a good view outside to standing passengers. Specifications giving other details of the cars follow:

GENERAL DIMENSIONS OF TRAILERS

Length over vestibule	48 ft.
Length over bumpers	49 ft. 2 in.
Width over side sill angles	8 ft. 4 in.
Width over lower deck eaves	8 ft. 6 in.
Width inside of side lining	8 ft. 1⅝ in.
Width between stanchions, exit doors	2 ft. 6 in.
Double doors	5 ft.
Height from rail to top of roof	10 ft. 4½ in.
Height from rail to top of ventilator	10 ft. 4⅛ in.
Height from top of rail to top of floor	2 ft. 4 in.
Center to center of truck	26 ft.
Center to center of side posts	2 ft. 5 in.
Height from top of rail to underside of side sill at sliding doors	10 in.
Step heights	14⅛ in. and 13⅛ in.
Diameter of wheels	22 in.
Weight	26,300 lb.
Seating capacity	60

DETAILS OF CONSTRUCTION

The side sills are of angle iron construction and the center sills extend from bumper to bumper. The underframe is reinforced by diagonal bracings, which are connected to the center sills, side sills and other members. Posts and carlins are of T sections. The side girder plates are ⅜ in. thick, American open hearth cold rolled and box annealed steel. The letterboard plates are No. 16 gage and the dash panels are No. 13 gage.

For the roof construction white ash carlins are bolted to the steel carlins and are also used midway between the steel carlins. The roof boards are of ⅞-in. poplar, 2¼-in. face tongued and grooved, except the hood roof, which is double sheathing ⅜ in. thick. The roof is covered with No. 8 cotton duck and No. 22 gage copper gutters are used over the doors.

The main body floor is double thickness with three-ply waterproof paper laid between the two layers of flooring. The lower floor is laid diagonally and is ⅞ in. thick by 2½-in. face red pine. The upper floor is ⅝ in. thick by 2½-in. face hard maple except at the mat strips, where the floor is ⅞ in. thick and of hard maple. All flooring is tongued and grooved. In the aisles and standing spaces ⅞-in. x 1-in. hard maple mat strips are used. These are spaced ½ in. apart and are ⅛ in. high.

The interior of the car is finished in clear birch, all molding being of the plain sanitary type. The headlining is regular quality ⅜-in. Agasote. The forward part of the car has longitudinal sanitary slat seats and the rear part of the car has cross seats, also of slat construction. The cross seats are equipped with Ottawa Car Manufacturing Company's pressed steel pedestals, with hinged cushions and wooden hand rail on the top of the back. The cross-seats are bolted to pressed steel brackets, which are riveted to the side plate girder. All stanchions and rails are of hard drawn aluminum, which contains 1½ per cent manganese. Window guards are attached to the side posts and are made of Clinton electrically welded 2-in. square mesh with ¼-in iron pipe frames.

The trucks have a 4-ft. 2-in. wheelbase and 22-in. diameter single plate chilled cast iron wheels with 2½-in. tread. The journal bearings are 3¾ in. x 7 in. and A.E.R.A. standard E-4 axles are used. The trucks have annealed cast steel side frames and are equipped with roller bearings. The miscellaneous equipment includes:

Air brakes: Canadian General Electric Company's automatic air brakes with conductor's emergency valve handles located at conductor's stand and at rear of trailer.	
Hand brakes	Peacock
Couplers	Tomlinson
Door and step mechanism	Consolidated Car Heating
Buzzers	Consolidated
Signals	Consolidated
Tail lights	Nichols-Lintern
Shades	None
Signs	Hunter
Lighting: Fifteen 46-watt lamps in Safety Car Heating & Lighting Company's fixtures, with Jefferson Glass Company's shades.	
Ventilators	Nichols-Lintern
Heaters	Peter Smith No. 2P
Enamel	Pratt & Lambert

Heaters for Drying Out Generators

THE MOIST climate of Havana requires special precautions in the use of electrical apparatus which has been left idle for any considerable time. In fact, the average humidity is so high that if a generator in the station should not be run for a week or more it is often necessary to give it a drying out run before it is fit to carry full voltage. Various ways of protecting the generators in the power station of the Havana Electric Railway against moisture were tried without much success until electric heaters were installed, just below the stator core. These heaters are run all the time that the generator is idle and keep the temperature of the winding well above that of the air. All of the generators in the power station of the company are now so equipped.

Co-ordinated Operation of Street Cars and Buses Urged

A Statistical Picture of How the Public Travels—1,623 Passenger-Miles per Capita in 1922 in All Conveyances—Street Railway Development Has Lagged — Opportunity Still Waits to Provide Monopoly Service

By George H. Davis
Ford, Bacon & Davis, Inc., New York, N. Y.

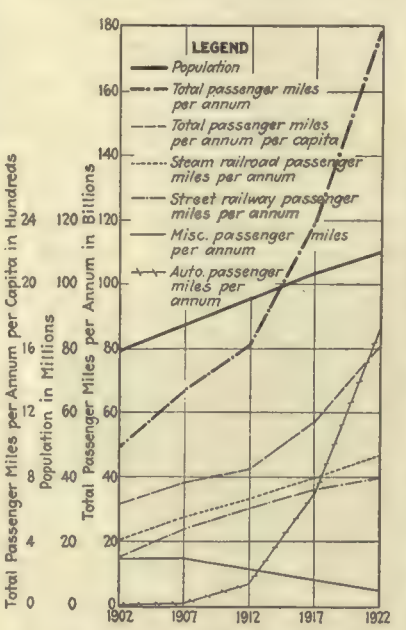
POSSIBLY there have been fewer advances in the business of city street railway passenger transportation during the past twenty years than in almost any of our other basic modern industries. While it was hardly to be expected that the rate of progress of the decade from 1890 to 1900 could be maintained, yet during the last ten years, at least, the industry has permitted other types of transportation to make marked inroads upon its business. That there have been real obstacles to progress in the electric railway industry all will admit, but a comparison of the type of electric street cars in use in 1902, which was the product of more than ten years of development, with that in use today, and of the passenger automobiles in use on those respective dates, is significant.

We are inveterate travelers. In fact, we almost live in conveyances. This is confirmed by a study of transportation records, largely obtained from government sources, which give the surprising information that the passenger-miles traveled per capita per annum by the population of the continental United States in all conveyances, including steam railroads, street railways, automobiles and miscellaneous conveyances, were approximately as follows: For 1902, 620; for 1907, 766; for 1912, 851; for 1917, 1,149, and for 1922 as much as 1,623. It will be noted in Tables I and II and in the diagram that the increase in total miles per capita in the period 1902-1907 is 24 per cent; 1907-1912, 11 per cent; 1912-1917, 35 per cent; 1917-1922, 41 per cent, and for the entire period 1902-1922, 162 per cent.

For street railways, the increase in passenger-miles per capita in the period 1902-1907 is 48 per cent; 1907-1912, 16 per cent; 1912-1917, 11 per cent; 1917-1922, 4 per cent, and over the twenty-year period it has been 98 per cent, while for their principal competitor, the passenger automobile, this increase has been from 1902-1907, 267 per cent; 1907-1912, 573 per cent; 1912-1917, 357 per cent; 1917-1922, 133 per cent, and for the twenty-year period the extraordinary amount represented by 26,100 per cent.

The transportation industry as a whole, over the period in question, has been aggressively and profitably conducted. The departments of transportation, however, that relatively have lagged behind in rate of increase have been the steam railroads, the street railways and animal power conveyances.

The enormous potential profit in the means and use of transportation has been thoroughly realized by the manufacturers of passenger automobiles, and as a whole the automotive industry has catered most completely to the pleasure and convenience of the traveling public. The volume of this business indicates its importance. The wholesale value of passenger automobiles and parts manufactured in the United States in 1921 was about $1,666,140,189. It is now probably the second industry in the country in value of products. Slaughtering is the first industry, its products amounting to $2,200,942,000.



Graphic Statistics of Passenger Travel in the United States

The present financial condition of the street railway industry is due largely to the lack of progress on the part of the companies in that they did not provide the kind of service demanded by the public, especially in the way of quiet, safe, convenient, flexible, comfortable and rapid transportation. In making this statement I am not unmindful of the vicissitudes through which the industry has passed during the past ten years. But

TABLE I—POPULATION AND PASSENGER-MILES PER ANNUM AND PER CAPITA, CONTINENTAL UNITED STATES—ALL CONVEYANCES

Year	Population Continental United States	Passenger-Miles					
		Steam Railroads	Street Railways	Passenger Automobiles	Miscellaneous	Total	Per Capita
1902	79,000,000	20,000,000,000	14,580,000,000	201,000,000	14,200,000,000	48,981,000,000	620
1907	87,320,000	27,719,000,000	23,800,000,000	995,000 000	14,400,000,000	66,914,000,000	766
1912	95,410,000	33,132,000,000	30,040,000,000	7,070,000,000	11,000,000,000	81,242,000,000	851
1917	103,500,000	39,740,000,000	36,200,000,000	35,000,000,000	8,000,000,000	118,940,000,000	1,149
1922	110,000,000	47,000,000,000	40,000,000,000	86,500,000,000	5,000,000,000	178,500,000,000	1,623

Note: The amounts in the various columns are based upon United States Census reports of 1902, 1907, 1912, 1917, various Interstate Commerce Commission reports, various reports by the National Automobile Chamber of Commerce, miscellaneous sources, and estimates. The passenger-miles for the street railways were calculated on the basis of an average ride per passenger of 2½ miles, and for the automobiles on the basis of 1.75 passengers per automobile-mile and 4,000 miles per automobile per year. These figures have been checked in various ways and are believed to be reasonably close to the actual values.

TABLE II—PASSENGER-MILES PER CAPITA PER ANNUM AND RATES OF INCREASE, CONTINENTAL UNITED STATES—ALL CONVEYANCES

Year	Steam Railroad	Percentage Increase Five Years	Street Railways	Percentage Increase Five Years	Passenger Automobiles	Percentage Increase Five Years	Miscellaneous	Percentage Increase Five Years	Total	Percentage Increase Five Years
1902	253		184		3		180		620	
1907	318	26	272	48	11	267	165	—8	766	24
1912	347	9	315	16	74	573	115	—30	851	11
1917	384	11	350	11	338	357	77	—33	1,149	35
1922	427	11	364	4	786	133	46	—40	1,623	41
Period	Percentage Increase by Decades and for Twenty-Year Period									
1912–1902	37	..	71	..	2,367	...	—36	....	37	..
1922–1912	23		16	..	962	..	—60	...	91	..
1922–1902	69	..	98	..	26,100	...	—74	....	162	..

Note: The basis for the figures in this table is given in the note under Table I.

the popularity, in our largest cities, of motor buses which have comfortable seats and de luxe furnishings and make convenient delivery shows that people are willing to pay for this kind of service. They have without doubt come to stay.

Advantages and Possibilities of Electric Railways

The distinct operating advantages of street railways are:

1. A steel roadway, which is far superior in smoothness and durability to any other road surface ever devised.

2. Practicable express train, high-speed operation, with few, long-spaced stops, through effective traffic regulation in congested areas, and

3. Relatively low operating costs with high density.

Street railways may largely retrieve their former financial status by:

1. The inauguration of a supplemental local bus operation, co-ordinated with the operation of the various lines of an express service.

2. The remodeling or supplementing of their roadways and equipment for express service.

3. The development of public sentiment in cities so that vehicular traffic on street railway tracks will be lessened and limited through effective traffic regulations, particularly in congested areas, enabling reasonably high speeds by the street railway cars for the proper accommodation of the public.

4. The reorganization of their plans of operation.

This combination may save the situation for both types of service, which are at present, under independent operation, often failing to earn a reasonable return on the respective investments.

Plan and Features of Combined Operation

Street railways generally occupy the middle of the street, while vehicle traffic occupies the entire roadway up to the curbs. In a combined street railway and bus operation, safety island stations might be established at distances ranging from six to eight blocks apart for the use of a railway express service, analogous to that of the subways of various cities, while the buses would furnish the local service, stopping for passengers at the curb at all street crossings. A transfer between bus and car would give passengers the advantages of both.

The public generally accepts the street railway as a public necessity and realizes that it can prosper and render adequate service only with a sufficient fare rate. The response which the public has made to recent fare increases on the street railway and the charges of the bus lines confirm this view. Through joint ownership and operation of the street railways and bus lines, with a scale of charges in accord with the service rendered, increased revenues to the street railways should be possible.

A transportation company should furnish all the types of service the public needs. There is at present a distinct place in street transportation for both the street car and the motor bus.

Street railway companies should follow the practice of industrials and maintain development departments so that the requirements of those served will be anticipated and satisfied. This policy means the discontinuance of the use of antiquated equipment and plans of operation, and the substitution of such facilities as will enable the companies fully to meet the public's natural and stimulated demands.

The time is ripe for a long step forward in diversified means of street transportation. The twenty-year period in which the industry has gained but slowly should be followed by a period of greatly increased earnings. In general, the companies already have the organization and often the franchises for conducting such supplementary bus service as may be required. They should now give the question of street transportation by all the various means a broad, exhaustive study, covering especially the necessities, pleasures, sentiments and practices of people desiring transportation. Such a study should include:

1. A review of types and modifications of street cars and street car service, and the manufacture of street railway equipment.

2. A thorough understanding of motor bus design, construction and manufacture, and the uses and possibilities of buses for co-ordinated or supplemental service in street transportation.

It is reported that at least 7,500 automotive engineers and designers are now constantly engaged in the development and manufacture of various types of autos, and that more than 100 individual companies are manufacturing motor vehicles, while the number of designers of street cars and street railway construction and equipment is limited to not more than one-tenth of this force. The number of street cars manufactured and put into service each year is almost insignificant compared with the number of automobiles manufactured yearly.

The original purpose of the organization of street railway companies was not to engage in a part only of the street transportation business but to carry practically all passengers seeking public conveyances. They should now, through new and old means of street transportation, regain their former position.

The present year marks the fortieth anniversary of the opening of the first hydro-electric tramway in the world. According to the London *Engineer* this was at the Giant's Causeway in 1883 by Earl Spencer, then Lord Lieutenant of Ireland. Credit for this venture must be given William A. Traill, the originator, and also the engineer and constructor of this line, which was 8 miles long with heavy gradients. Power was obtained from a waterfall on the River Bush. Originally current was collected from a side conductor or third rail, later replaced by an overhead trolley.

Subway Construction Costs Have Increased

Expense Has Been as High as $2,500,000 a Mile in Lower Manhattan—Present Costs Probably Double Those Prior to War

SOME interesting figures on the cost of rapid transit construction in New York and other features of that city's subway and elevated systems were given in a talk before the Providence Engineering Society, Providence, R. I., on May 15, by Robert Ridgway, chief engineer Transit Commission, State of New York. Referring to the construction cost of the existing subways in New York, Mr. Ridgway said that it varied from $700,000 per track-mile in an outlying portion of Brooklyn to $2,500,000 per track-mile in a very congested section of lower New York. This cost included track, stations, maintenance and underpinning of abutting buildings, and maintenance and restoration of surface, subsurface and overhead structures, but did not include the installation of third rail, signals, light and other railroad equipment. At pre-war prices the cost of a steel elevated railroad, also including track, stations and other appurtenant work, ranged from $235,000 to $275,000 per track-mile, depending on whether a three-track or a two-track structure was built. Under present market conditions, the speaker thought these costs would probably be doubled.

He declared that there are but few cities in the world where a direct profit can be expected from the investment necessary to construct and equip an extensive system of subways. It requires many huge office and commercial buildings, large and intensively patronized shopping and amusement districts, and the concentration of a population in many large apartment house districts.

The adoption in New York of the shallow type of subway instead of the deep subway, like those in London, has been justified, in the speaker's opinion, by experience, but the art of subway construction has advanced since 1900, and experience has shown the necessity of longer stations, provisions for ventilation, emergency exits between stations and other improvements. New York is believed to be the only city in the world that operates both express and local service in subways. The subways in other cities generally contain only two tracks. Excluding the privately-owned rapid transit lines constructed prior to 1913, but including the city-owned subways and extensions built prior to that date, there has been expended for construction of the dual rapid transit system in New York City nearly $400,000,000. This is in addition to about $190,000,000 which has been expended by the companies in equipping all of the new lines and in improving their old lines. New York has been called a subway city, and rightly so, because it has more miles of rapid transit subway than all of the other cities of the world combined.

Much of the rapid transit system in New York in the outlying sections is elevated, and elevated lines are still to be considered for use in such sections because their cost per mile is but one-fourth or one-fifth that of subways of the same track capacity. In such locations something can be done to make the appearance of the structure less objectionable. For example, at stations at parkway crossings in New York the steel members have been incased in concrete, the surfaces of which are tooled and decorated with colored tile with pleasing results. On a boulevard 200 ft. wide, in the Borough of Queens, a reinforced concrete viaduct was substituted for the standard steel structure, and its surfaces were also treated in the manner described. While such a massive structure is in keeping with its setting in that location, it would be out of place in the ordinary city street because it would cut off light, and its columns would offer greater obstructions to traffic than do steel columns.

The open-cut method of construction for rapid transit lines is also worthy of consideration where property values are low enough to permit the taking of private rights-of-way for this purpose. Some of the old steam rights-of-way controlled by the Brooklyn Rapid Transit Company have been improved by depressing the tracks in this manner.

Working Off the Rough Edge on Prospective Motormen

BY J. G. JEFFERY
Director of Pubic Relations Los Angles Railway

THE Los Angeles Railway, Los Angeles, Calif., has equipped a special car known as the "rough edge" car for instruction purposes. When a new man is accepted for service as a motorman, he is given only a short talk on the fundamentals of his job before he is put on a car, but it is the "rough edge" car and not a passenger car to which he is assigned.

The "rough edge" car is built practically the same as



Los Angeles Test Car Used to Work Off the Rough Edges of New Motormen

a passenger car except that the seats in the open end sections are placed longitudinally, as this gives more space for student trainmen to observe the work of the men at the controller than if cross-seats like those on regular passenger cars were used. The step at the right rear of the car is removed so that passengers will not mistake it for a regular car and attempt to board.

A class of not more than four new motormen is taken from the instruction department by an instructor and put on the "rough edge" car. The instructor runs the car until a district of light travel is reached. During the first part of the run he calls attention to the various signs on the overhead wire, the method of operating at electric switches, and the necessity for throwing off the power while passing special overhead work. He points out the traffic officers at intersections, the sema-

phore "go" and "stop" signals, and other features of traffic with which the new man must become acquainted.

When a district of light travel is reached, usually at a terminal, the power is switched off and the new men in turn sit at the controller and are taught how to feed it. After each man has learned the "feel" of the motorman's position, the students begin operating the car up and down the track where they will not be bothered by other traffic.

On the first day they learn to aim at definite stop points and get practice with late conductor's signal bells given by the instructor. On the second and third days, the new men operate the "rough edge" car through semi-congested territory and finally through the downtown streets. They are taught about the mechanical features of the car and learn how to locate trouble.

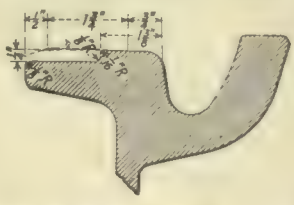
In the opinion of the instruction department, the important feature of this plan is that a new motorman is capable of handling a car under various conditions and understands the mechanical features before he is placed on a regular passenger car in service. The new man's remaining instruction is given by a regular motorman to whom he is assigned. Having learned the fundamentals of operation on the "rough edge" car, the line instructor can devote his attention to teaching the new man matters peculiar to the line on which he is running, the proper attitude toward passengers, etc.

Barbey Rail Has Reduced Noise

AS A result of numerous complaints from residents of the neighborhood about the "unearthly noises" made by cars taking the curve at Washington Avenue and Marion Street, Scranton, Pa., the railway installed in 1915 a "frictionless" rail for the inside rail of the curve. The rail is made under the Barbey patent and is the ordinary Lorain section 132, with part of the head machined down ¼ in. as shown in the accompanying illustration. The theory of the curve is that the narrower the rail head the less the friction and noise.

At this point the service is a seven and one-half-minute headway and during the eight years since the rail was laid the head on the rail has worn nearly flush with the planed surface. Practically no complaints about squealing have been received since the installation of the Barbey rail.

No change has been made in foundation, ties or paving where this rail is used. The practice of greasing curves is the same as for other rail.



Head of Rail Is Machined Down ¼ In. for Curves

More recently the Barbey rail has been used by the Scranton Railway at various other intersections and has given very satisfactory results, not only reducing noise to a marked extent, but also giving longer wear than the ordinary type. A curve installed in November, 1921, at the intersection of Lackawanna and Wyoming Avenues, where the headway is three and one-half minutes, shows practically no wear after sixteen months service.

Interlocking Traffic Signals Hinder Railway Operation

AT ERIE, PA., the problem of placing traffic signals on streets with railway tracks has been solved in a way quite different from that in effect in Scranton, Pa., and described in the JOURNAL for May 12. A system has recently been installed for the control of both cars and vehicles on, and crossing, a section of State Street. Regulation is effected by colored electric lights suspended from the span wires of the Buffalo & Lake Erie Traction Company.

In the center of each intersection from Sixth Street to Thirteenth Street inclusive is hung a signal box containing three lights and twelve lenses, three on each side of the box, as shown in the accompanying illustration. The lenses are of red, green and white, and are arranged in reverse order on alternate sides, so that the illumination of a single lamp gives simultaneously a "proceed" indication on State Street and a "stop" indication on the cross street, and vice versa. All of the signals are on a single circuit, which is controlled by a traffic policeman in a tower at the curb at Twelfth and State Streets.



One of Eight Interlocked Signals at Successive Crossings

This method of suspending the boxes from span wires is admirable in that there are no columns or towers in the street to obstruct traffic. Moreover it places the signal well up in the air where it can readily be seen by the drivers of all vehicles.

A serious objection exists, however, to the method of controlling all signals from a single point. The trolleys, unlike other traffic, are not able to continue block after block without interruption so long as the signal remains clear, but must ordinarily stop at each corner for passengers. Thus they are unable always to take advantage of the privilege of going ahead, but they are always forced to heed the red light.

For this reason the installation of the interlocking traffic signal system has been rather a handicap to the railway. It has been of some benefit to other vehicles perhaps, but has meant no economy to the city as police officers are stationed at most of the intersections anyway. On the whole, observation of the operation of this plan at Erie indicates that on trolley streets individually controlled signals are better than interlocked signals.

Liverpool, Glasgow, Edinburgh Compared

Statistics on Traffic, Fares and Other Phases of Tramway and Bus Operation in These Cities Are Given in Report to New York Commission—Liverpool and Glasgow Shown to Be Developing Rapid Transit Surface Lines

DANIEL L. TURNER, consulting engineer New York Transit Commission, submitted to that commission on May 9 a report discussing car and bus design in relation to street area occupied, and also observations on city traffic in Liverpool, Glasgow and Edinburgh. An abstract of his comments on the first subject appeared in the June 9 issue of this paper. In his report on transportation conditions in Liverpool, Glasgow and Edinburgh, Mr. Turner expresses his great appreciation of the courtesies extended to him by the tramway managements in the cities visited.

An abstract follows of the technical portions of the report on these three cities:

LIVERPOOL

Liverpool, which has an area of about 33 square miles, is approximately a semicircular city located on the north side of the Mersey. In 1922 its population, within the city limits, was about 803,000 people. The Metropolitan District centering around Liverpool within 12 or 15 miles has an aggregate population of 1,250,000 people.

Liverpool has all kinds of municipal transit facilities: A subway line, an elevated line, trolley lines and buses, but the most important transit facilities are the trolley or tramway lines. The subway is a deep level line traversing Liverpool for a short distance and then crossing under the Mersey by tunnel and traversing the territory on the south side of the Mersey for a short distance. There are only seven stations on the line, two in Liverpool and the five others on the opposite side of the river. It was originally constructed for steam railroad service but was subsequently electrified.

The elevated line runs along the waterfront for a distance of about 6½ miles and has two tracks. There are sixteen stations on the line, the average distance between them being about four-tenths of a mile. The line was originally built to relieve the congestion existing on the waterfront street and to facilitate the trucking traffic. Neither the elevated nor subway line transfers to the surface lines. Traffic figures of the elevated and subway lines are not available.

During the calendar year ended Dec. 31, 1921, the surface line traffic in Liverpool was divided about as follows:

On the tramways	169,800,000 passengers	98.6 per cent
On the buses	2,430,000 passengers	1.4 per cent
Total	172,230,000 passengers	100 per cent

This was a reduction in total traffic compared with 1920 of about 48,000,000 passengers. The riding habit is only approximately obtainable, because the amount of traffic originating outside the municipal limits is not known. But the outside traffic is relatively small, so if all of the traffic is assumed as originating within the city limits, and the population is taken at 803,000, the riding habit amounted to 214 rides per capita per year, on the tramway lines and buses combined.

During 1921 ten bus routes were operated, but four of them were dropped at different times so that only six routes were continued in operation throughout the year. The bus service was introduced largely during the period of the war when it was impossible to make adequate renewals to the tramcars. In other words, the bus service was largely an emergency service. Now the buses are used chiefly as feeders to the tramway lines.

All the tramway cars in Liverpool are double-deck cars, top inclosed. The most modern type provides for twenty-two longitudinal seats on the lower deck, and forty-two cross seats on the upper deck, or a total seating capacity of sixty-four, and eighteen passengers are permitted to stand, nine on each deck. These cars are 16 ft. 1½ in. high, 7 ft. 4 in. wide over all and 30 ft. 2 in. long over all.

On some of the lines first-class cars were operated on intervals of ten or fifteen minutes. The lower decks of these cars have upholstered seats and they charge approximately a double fare, the upper deck charging the regular fare. The other cars charge one fare for both upper and lower decks.

The Pier Head on the Mersey is where the most intense operation occurs. This is really the neck of the bottle of the Liverpool tramway system. About 160 cars per hour are operated over the several routes located at this point, the maximum operation on any single track being about a three-quarter-minute headway. At another terminal, at Haymarket Junction, about sixty cars per hour were operated on eight or nine routes. At this point, to facilitate the loading of the cars, the passengers were confined in queues inclosed by pipe railings erected on the sidewalk at the curb lines.

Zone fares prevail. The fares on both the tramways and buses during 1921 varied from 1d. by half pennies to 4d. and over. The average fare was 2.128d. About 66 per cent of the total traffic was carried on the 2d. fare. For 2d. a passenger can ride from the center to the limits of old Liverpool, or just outside of the 2-mile circle. To reach the outer limits of new Liverpool, or within the 6-mile circle, an additional 2d. fare is charged if it is a broken ride, but through fares may be obtained from the center to the limits of the present city for about 3d. There are no free transfers.

Liverpool owns and operates its tramway lines. The operation is controlled by a committee of the Council. The equipment and operation of the properties is under the direction of the general manager of the Liverpool Corporation Tramways, who reports directly to the Council Committee, but the construction and maintenance of the tramway tracks is under the charge of the chief engineer of the city of Liverpool, who also reports directly to the Liverpool Council Committee. The general manager and the chief engineer are independent of each other, but, of course, there is full and

complete co-operation between the departments. There did not appear to be any serious difficulties arising from this condition of affairs, but it was unusual, and the desirability of such an arrangement seems doubtful.

The most interesting thing in the Liverpool transit situation was the system of high-speed surface lines proposed by Mr. Brodie, chief engineer of the city. This type of line has been developed to provide relatively rapid transit in the place of subway or elevated lines. The tramway line is proposed to be located in the center of an arterial highway, 120 ft. wide. The width of the highway is made up as follows:

Two paved sidewalks	8 ft. wide
Two sidewalk grass and tree plots	10 ft. 6 in. wide
Two curbs and gutters	2 ft. wide
Two vehicular roadways	25 ft. wide
One centrally located grassed area occupied by the tramway line	29 ft. wide

making a total width of 120 ft. It is proposed to fence in the tramway right-of-way on either side to keep off pedestrians, dogs, etc. Only a low fence would probably be required. The transverse roads are only permitted to cross the tracks at about every one-quarter of a mile, at which points station stops will be provided. The highway crossings at these quarter-mile points will be made at grade. Average speeds, including stops, of 20 m.p.h. can be obtained on such a line. This speed is better than the speed now reached on the local train services on the elevated and subway lines in New York. The New York subway express train service is scheduled at only 25 m.p.h. The cost of building such a line would be very much less than a subway or elevated line, for its additional cost over an ordinary surface line would be only the cost of the extra street width. Mr. Brodie has proposed a number of such lines for Liverpool, and a number of old roads are being widened to conform to the dimensions of such high-speed arterial ways. Such a system of providing rapid transit in smaller cities is capable of being developed to the very great advantage of the community.

GLASGOW

Glasgow is approximately a circular city of about 20 square miles area. The outline of its boundary is irregular, but the city can be almost completely circumscribed by a circle of 3 miles radius. The River Clyde runs through Glasgow. No up-to-date population figures for the city itself are available. In its tramway report the corporation gives the population of Glasgow and the suburban area served by the tramway lines as about 1,339,000. It is believed that the city itself has a population approximating 1,200,000 now.

Glasgow is now served by two types of transit facilities—tramway lines and a single subway line. There are no bus lines.

The subway is a deep tube line, operating in a circular route about 6½ miles long. About half of it is located north of the Clyde and the other half south of it. The tubes are about 11 ft. in diameter inside and the railroad is operated by a cable. Until recently it was owned by an independent company, which had to suspend service because of the inability of the line to support itself. Recently, however, the city acquired possession and is now operating it. My understanding is that it ultimately expects to electrify the line. As an independent line its usefulness was limited, but as a loop line, connecting with all of the surface tramway lines, it can serve a useful function in distributing the traffic around the central business area of the city on both sides of the Clyde.

During the year ended May 31, 1922, the tramways carried about 431,372,000 passengers, or about two and one-half times as much traffic as the Liverpool system, although Liverpool has about 50 per cent more area than Glasgow. The riding habit in Glasgow is about 322 rides per capita per year. In New York the rides per capita for 1922 were about 435, or about 35 per cent greater than in Glasgow.

During 1922 the Glasgow system operated about 100 route-miles, equivalent to approximately 200 miles of single track. The longest route now operated is the tramway from Paisley on one side of the city to Bailieston on the other side. The length of this line is approximately 13 miles. The route is being extended at both ends, and when these extensions are completed the two termini of the route will be about 25 miles apart. The ride from Paisley to Bailieston now costs 8½d., or a little more than 15 cents. No fare has yet been fixed for the 25-mile ride.

The tramway cars in Glasgow are practically of the same type—double-deck cars with the body and upper deck inclosed except for the portion of the upper deck over the platform. The cars have a body length of about 17 ft. with 6-ft. platforms and are 7 ft. 2 in. wide. The over-all height is 16 ft. 1 in. They are mounted on single-truck cars and weigh empty about 25,280 lb. Inside of the car below there are twenty-four longitudinal seats and above there are twenty-eight cross-seats inside and 10 seats outside. During the rush hours six passengers are permitted to stand inside below. As a matter of fact, oftentimes more than this number stand, but the policy is to keep down the standing passengers to six as nearly as possible. The company constructs and equips all of its own cars.

The car crews are trained both as conductors and as motormen. A man is first taken into the service as a conductor. After about eighteen months of service he is required to take the training as motorman, whether he is to serve afterward as a motorman or not. This method of training men places the company in a very strong position in case of any labor troubles or on occasions when an extraordinary demand is made for service, as it is relatively easy to break in men to serve as conductors temporarily, whereas to train motormen is another matter.

Zone fares prevail. The ordinary fares range from 1d. to 9d. by ½d. grades. There is also a minimum token fare of ¾d. The minimum fare distance is about 1.15 miles, that is, for the ¾d. token fare, or the minimum ordinary fare of 1d. The maximum ride is 15.27 miles for 9d. Only a few of the long rides have fares of 6½d. and over. The average fare paid by a passenger is 1.306d. The distance paid for on the average by this passenger is for a ride of 1.96 miles. Fifty-seven per cent of the passengers paid a penny or a ¾d. token for their fare, and approximately 40 per cent of the total revenue of the company was derived from these fares.

Just as Liverpool has done and is doing, Glasgow is preparing for high-speed surface tramway lines. In the outlying sections the roadways are being widened for such lines. The same general plan is being followed as in Liverpool.

The Glasgow tramways are owned and operated by the municipality, under the direction of a committee of the Council. The municipality took the lines over in 1894. In 1917 the whole indebtedness of the tramways was cleared off. At present, the only indebtedness is that which has accumulated since 1917 for the improve-

ment and extension of the system. This does not amount to a very large sum.

EDINBURGH

Edinburgh and Leith together have an area of approximately 19 square miles. Leith is the port of Edinburgh and is practically surrounded by it. The combined cities approximately form a circular city of about 3 miles radius. The population served by the joint transit facilities in 1922 was about 420,000. In 1920 Edinburgh was enlarged to include Leith and several adjoining towns, giving an area aggregating about 51 square miles, but the transit facilities have not yet been extended to include all this area.

The tramway system in Edinburgh is in process of transformation from a cable system to an electric system. Although the cable conduits were available, the city has adopted the overhead system because of its relative cheapness in cost as compared with the underground trolley system. Approximate statistics for the year ended May 15, 1922, follow:

STATISTICS OF TRAMWAY SYSTEM

	Single Track Mileage		Passengers Carried	
	Length in Miles	Per Cent of Total	Number	Per Cent of Total
Cable	49	43	67,986,000	67
Buses	47	41	20,408,000	20
Electric	18	16	12,633,000	13
Total	114	100	101,207,000	100

Note: The bus mileage referred to above means the mileage operated over by the buses in both directions of travel, or means the length of the streets traversed by the buses, doubled.

Based on the population served, as estimated by the tramways department, the total traffic amounts to about 241 rides per capita, as compared with 214 for Liverpool and 322 for Glasgow.

The corporation looks upon the bus operation as only suitable as feeders. Buses have also been used as substitutes for cable routes during the time of transition from cable to electric operation. I was informed that as the transition from cable to electric traction takes place the latter will be substituted for a number, if not all, of the bus routes also, as rapidly as it can be effected economically.

The car equipment on the cable lines is of an old type of double-deck car. The car equipment utilized on the electric lines is of the same general type as that used in Glasgow—that is, double-deck closed-top cars with about the same seating arrangements as in the Glasgow cars. The motor buses in use are single-deck, seating about thirty-one.

Zone fares prevail, as in Liverpool and Glasgow, and range from 1d. to 8d. The average fare per passenger on the cable lines was 1.949d.; on the buses 2.024d., and on the electric lines 1.476d. As in Liverpool and Glasgow also, the Edinburgh system is municipally owned and operated. The responsibility for the ownership and operation rests with a committee of the Council, which directs the operation through a general manager. The general manager is responsible, as in Glasgow, for the construction and equipment as well as operation. There is no divided responsibility such as obtains in Liverpool.

Carrying Safety to the Public—VII*

Public Safety May Be Promoted in the Industries Through Organized Instructional Work—A School for Foremen Is the Means of Reaching a Large Group of Workers

BY C. W. PRICE
Vice-President in Charge of Public Safety, Elliott Service Company, New York City

A FEW years ago the average railway executive and industrial manager thought of industrial safety and public safety as two separate and distinct fields of activity. Now they have learned from experience that these two fields merge and overlap; that each has a vital bearing on the other. They are more and more coming to see that safety is a habit, an attitude of mind, not a technique; that a workman in a factory who has become thoroughly imbued with the safety idea and has learned to operate his machine with safety is pretty apt to carry that habit, that attitude of mind, in favor of safety, from his work out to the street as well as into his own home.



Part of the Class of 1,500 Foremen Enrolled for the Safety Instruction in Milwaukee

The Carnegie Steel Company, for instance, in the

*Seventh of a series of ten articles.

Pittsburgh district is not only interested in stimulating community safety in the towns in which its plants are located, but is including safety on the street and in the home as a part of the daily instruction program for its workmen.

Therefore, it is quite proper in this series of articles on public safety that we give a place to industrial safety and point out how, in an organized community effort, safety in the industries may contribute directly to safety of the public. In 1917 a safety school for foremen was organized in Pittsburgh, and so successful did it prove that since that time in some thirty cities in which local safety councils have been organized similar schools for the instruction of foremen have been conducted each year.

Industrial managers have come to see that the attitude of workmen toward safety depends on the attitude of their foreman. He must not only know how to organize safety in his department, but what is more important, he must believe in it just as he believes in any other feature of his work which has to do with efficiency. He must get back of the movement for safety, and stay back of it so unmistakably that not a workman will doubt for a moment what he proposes to do to safeguard their lives—and what he expects them to do. Possibly the greatest service which the school for foremen renders is to convince these men of the value of safety and imbue them with the safety spirit and enthusiasm.

In the cities where schools for foremen have been conducted, the superintendent, foremen and subforemen in charge of railway construction work and repair shops have attended the classes and have received valuable help.

The course of study in the school should include ten lessons—each lesson covering some important phase of safety. The material to be treated is of the nature suggested by the following subjects: "Safety and Industrial Efficiency," "The Foreman the Determining Factor," "Workmen's Safety Committee," "Mechanical Guards," "Visualizing Safety on the Bulletin Board," "Inspection," "First Aid," "Shop Sanitation," and "Reaching the Workmen Through Community Safety."

Each lesson should be presented by some man who has had practical experience in his own plant. Half of the lesson should be given up to a round-table discussion, and the foremen should be encouraged to ask questions, to express their views, and if possible to suggest new topics.

The success of the school will depend largely on the ability of the chairman who presides at each session, and on the character and ability of the speakers. The chairman must be thoroughly familiar with safety, must know how to stimulate enthusiasm in the meeting, and must be able to draw out discussion. The speakers should not only know their subjects but should present them in a convincing manner.

In many schools the session is opened with singing and a motion picture film is shown at the close.

When the course of ten lessons is finished it is customary to give a graduation banquet at which diplomas are presented and inspiring addresses are delivered by two or three prominent citizens.

The value of a school for foremen will not be confined merely to the instruction of a number of individuals. The foremen of plants in which safety has not been organized may quickly, say within a period of ten weeks, familiarize themselves with the experience of plants in which successful work has been done. They then will go out of the school convinced, because they have received first-hand information from men of experience, and because they have heard the testimony of foremen from other plants, speaking out of their own experience.

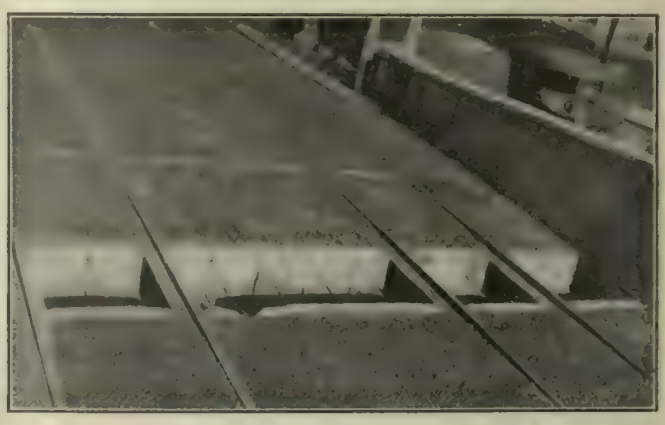
Through the influence of the foremen who carry the message back to their managers many plants will be stimulated to organize safety. In St. Louis, for instance, in 1917 there were 110 industrial workmen killed by accident, and in 1922 only fifteen; in Milwaukee, substantial reductions were made in industrial accidents since 1920; and in Louisville, accidental deaths were reduced from thirteen to five in two years. The schools for foremen in each city played an important part.

The school for foremen offers an exceptional opportunity to introduce into the industries of a community this new and larger conception of safety, and to broaden the scope of the safety instruction to include safety in the home and on the street, and then to furnish a new appeal to the workmen.

In communities where local councils have been organized it is customary each year to arrange for two or three luncheon conferences of factory managers. These conferences offer a splendid opportunity to acquaint the managers with the more important developments of community safety and its value to the industries.

The magnitude of the instructional work in the foremen's school is shown by the photograph of the class in session at Milwaukee. This is one of the largest groups ever gathered for the purpose, more than 1,500 men being enrolled in the course. The picture was obtained through the courtesy of C. M. Anderson, manager of the Milwaukee Association of Commerce Safety Council.

Concrete Ditch Barrier at Entrance to Tunnel Stops Automobiles



A Practical Device to Keep Automobiles Out of Tunnel

A CONCRETE ditch has been built across the east entrance to the Twin Peaks tunnel in San Francisco for the purpose of keeping motorists from trying to drive through the tunnel. Before this ditch was built a motorist drove his car part way through the tunnel. He met a street car and was forced to back his car out. The ditch is about 3 ft. across and if an auto should be driven across it, the front wheels would drop in and the further progress of the vehicle would be arrested.

New Transfer System for New Orleans

Present System Involves 12 per Cent Misuse—Requirements Complicated by Necessity for Second and Third Transfers and Reversal of Direction—New Form Would Require Conductor to Punch Time, Line and Direction at Time of Issue

SECTION V of the report by John A. Beeler on local transit conditions in New Orleans deals with the order of installation of the various changes in track layout, routing, etc., which have been discussed in previous issues of the JOURNAL. This was worked out to give the most practical plan, taking into account the convenience of patrons, the immediate transportation needs of the city, the official paving program, the minimum number of temporary changes, and the most economical expenditure of time and money.

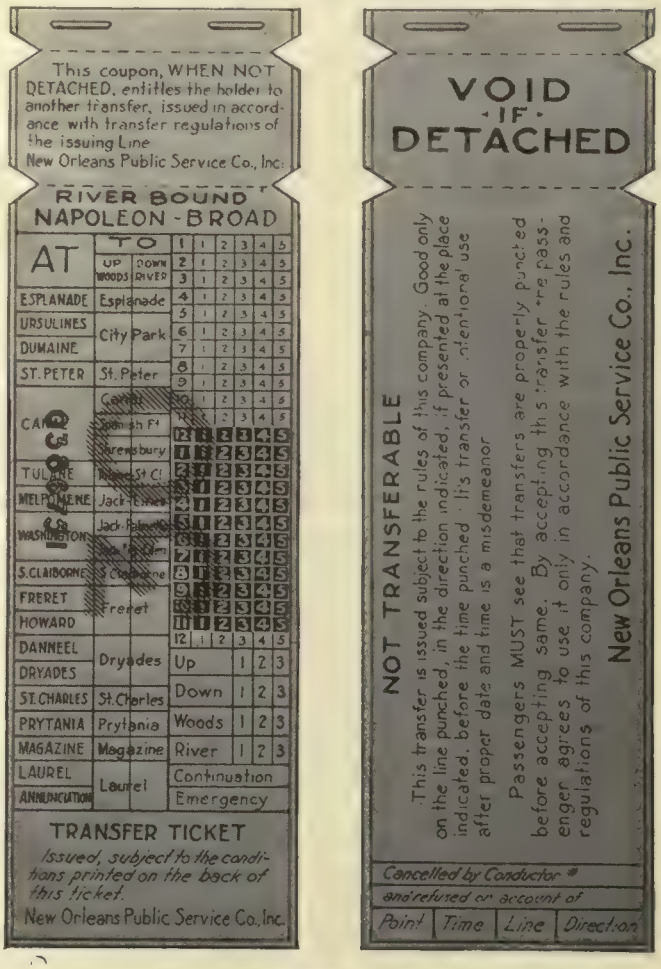
Section VI of Mr. Beeler's report takes up the question of transfers and deals with the present practice and recommends a new transfer which it is believed will regain for the company some $134,000 a year of the amount now lost through misuse. The report points out that the present system of transfers is not a universal one. It was not founded upon any particular method, but is an outgrowth from the regulations adopted haphazardly by the individual companies years ago. The operation of belt lines, with other lines doing combination trunk and crosstown service, presents a complicated situation. To establish a universal transfer under these conditions would be extremely difficult, if not impracticable.

Since 1908 on the New Orleans system the proportion of passengers using transfers has been steadily increasing. In that year, transfer passengers numbering 15,492,363 were 20 per cent of the revenue passengers, which numbered 77,459,499. This percentage has increased steadily each year until in 1922 it was 30.21 per cent, the actual figures being 31,934,874 transfer passengers and 105,712,503 revenue passengers.

It is pointed out that the total revenue passengers have increased 50 per cent, while the transfer passengers have increased more than 100 per cent. The enlarged use is undoubtedly due to one or more of the following reasons: Changes in routing, changes in location of the population, or abuse of the privilege. The first item is considered almost negligible, as few changes in routing have been made. Changes in population account for some of the increase, as many sections, especially those in outside districts, are growing rapidly. The abuse factor also contributes largely to the growth. The engineer states that the looseness of the present system, combined with the lack of systematic checking, has invited and encouraged abuse. He comments that there will always be more or less loss in connection with the transfer, and that the problem is how best to reduce this to a minimum. From observations made and from information furnished by the railway, it is estimated that the misuse of the transfer privilege is at present not less than 12 or 15 per cent of the total collected. On a basis of the lesser figure, if a system can be devised that will reduce the abuse by one-half, the revenue will be increased $134,000 annually.

PROPOSED TRANSFER SYSTEM

It is stated in the report that a universal transfer system can be adopted under the proposed routing plan. It should be based on the principle that any rider, upon payment of a fare, is entitled to one continuous trip from any point on the system to any other point by the shortest practicable route. Provision must be made for use of more than two lines to reach the desired destination and the transfer form must be simple and readily understandable.



Proposed Form of Transfer for Use in New Orleans

A form of transfer that will admirably fit itself to the requirements in New Orleans, according to the engineer, is reproduced herewith. It is recommended that it should be printed on four different colored papers, one for each direction of travel. Its face contains the following information:

1. Day of the month in large red numerals.
2. Name of the issuing line.
3. Direction of the trip of issuing line.
4. Line to which transfer is issued.
5. Point at which transfer must be used.
6. Time limit after which transfer becomes void.

The points requiring punching by the conductor when issuing are three: Time, line and direction. In making the latter punch, conductor will indicate whether it is the first, second, or third transfer, by locating it under 1, 2 or 3, as the case may be, in the line which indicates the actual direction of travel. Conductors when issuing

TRANSFER CHART
FOR THE NAPOLEON-BROAD LINE
Woods Bound

Note-Abbreviations
U = Up
D = Down
R = River
W = Woods

TRANSFER POINT	TO LINE	DIRECTION OF TRANSFER	FURTHER TRANSFERS	FIRST CONTINUING TRANSFER				SECOND CONTINUING TRANSFER			
				TRANSFER POINT	TO LINE	DIRECTION	FURTHER TRANSFERS	TRANSFER POINT	TO LINE	DIRECTION	FURTHER TRANSFERS
Annunciation	Laurel	U		Peters Ave	Dryades	D	None				
					Louisiana	W	None				
				Louisiana Ave	Tchoupitoulas-Gentilly	W		Elysian Fields	Elysian Fields	W	N
								Lafayette Ave	Desire	D	
								St Claude Ave	Tulane-St Claude	D	
Laurel	Laurel	D		Jackson Ave	Jackson Lines	R or W					
				Canal St	Canal						
					Shrewsbury	W	None				
					West End						
					North Claiborne	D					
		U		Walnut St	Broadway	W					
Magazine St	Magazine			Peters Ave	Dryades	D	None				
				Louisiana Ave	Louisiana	R or W					
		D		Jackson Ave	Jackson Lines						
		U	None								
		U		Peters Ave	Dryades	D	None	Issued only to passengers boarding car beyond Magazine St.			
Prytania St	Prytania										
		D	None	Louisiana Ave	Louisiana	R or W	None	Issued only to passengers boarding car beyond Magazine St.			
				Jackson Ave	Jackson						
				Peters Ave	Dryades	U or D					
				Broadway	Broadway	R or W	None				
		U		Carrollton Ave	Tulane-St Claude	D		Oak St	Shuttle	W	None
								S. Claiborne Ave			
				Louisiana Ave	Louisiana	R	None	Dryades St	Dryades	D	None
						W		Howard St	Howard-Freret		
						R	None	Dryades St	Dryades		
St Charles Ave	St Charles			Jackson Ave	Jackson Lines	W		Howard St	Freret-Howard	D	None
		D						S. Claiborne Ave	S. Claiborne		
				Canal St	Canal			Dauphine-Burgundy	Esplanade	W	None
					Shrewsbury	W			Paris-St Bernard		
					West End			N. Rampart St	Tulane-St Claude	D	None
					North Claiborne	D					
					Desire	D		Elysian Fields	Elysian Fields	W	None
					City Park	W	None				

Portion of Transfer Chart Showing Transfer Conditions in One Direction for the Napoleon-Broad Line, New Orleans

the last transfer necessary for the patron to reach his destination will give him a transfer without the upper coupon. Usually this will be the first one.

Direction of travel is designated by the words "Up," "Down," "River," "Woods." Aside from the normal transferring in the same general direction, it is necessary that the patrons have the privilege of reversing their direction of travel at certain points on the system. This transfer is designed to permit this, and at the same time guard against its abuse, but in order to allow this privilege it is necessary to designate certain lines in both up and down town districts, as "change of direction lines." The report then lists eight uptown lines and seven downtown lines that come under this category.

The rules that will govern transfer issuance and acceptance are as follows:

Transfers will be issued for a continuous trip upon request at the time the fare is paid. They will be accepted only at the designated point on the line and in the direction indicated, if presented within the time limit shown. A transfer will be issued good only in the same general direction except on "change of direction lines." On such lines if the conductor takes up a transfer with the coupon attached, he can issue a transfer good for travel in a direction opposite to the direction shown in the first transfer. Shuttle lines should collect fares and accept transfers. They should issue a "ride-ticket" in lieu of a transfer, which will entitle a holder to all the transfer privileges of a cash fare.

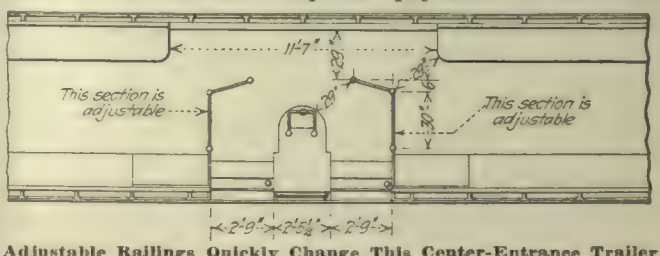
The report recommends that a method of careful inspection and checking should be adopted. Where a line is served by safety cars, the use of transfer machines is recommended. Each conductor should be supplied with a complete set of rules governing the issue of transfers, and this should be made up in looseleaf form to permit easy revision.

A portion of a transfer chart for one of the most intricate lines proposed, so far as transfer conditions are concerned, is reproduced with this article. A similar chart for the opposite direction of travel for the same line was included in the report, the pair serving as an example of the manner in which the transfer privileges of each line should be tabulated.

Cleveland Trailer Being Changed

Adjustable Railing Installed to Improve Pay-Enter and Pay-Leave Conditions—Results to Date Have Proved Satisfactory

A NUMBER of electric railway properties are using a design for trailers known as the Cleveland trailer design. Hence added interest attaches to the fact that the Cleveland Railway is experimenting with some changes in the floor plan. These changes are in the form of a railing and are such as better to fit the car for the Cleveland system of fare collection, which is pay-enter on the inbound trip and pay-leave on the out-



Adjustable Railings Quickly Change This Center-Entrance Trailer from Pay-Enter to Pay-Leave

bound trip. The new form of railing is shown in the accompanying diagram, which represents the center of the car. In this railing the two sections transverse to the car can be raised or lowered, but the shorter sections, which are set at an acute angle to the center line of the car, are permanent. The operation of the railing is then as follows:

When the car is going down town, or pay-enter, the adjustable railing toward the rear of the car is lifted and the one toward the head of the car is lowered. Then,

as the passengers enter individually by the front door, they pass by the fare box, and those who expect to leave the car by the exit or rear door before it reaches the terminal gather in the rear of the car, while the others gather in the front of the car. At the final point of unloading both bars are lifted and passengers leave by either door. When the car is going out in the evening the conditions are reversed. On that trip the car is operated pay-leave, and at the principal downtown loading point or points both bars are lifted. Then the rear one is lowered. This makes passengers who leave the car file by the fare box.

The new arrangement of railings meant that some seats opposite the fare box had to be removed. This cuts down the seating capacity of the car by four seats, but not the total carrying capacity. As, however, trailers in Cleveland are used only during the rush hours, this was not considered a great disadvantage. It has been found that the method adds slightly to the time of loading, but it has not been necessary to reduce the scheduled speed of the runs, and fewer fares are missed. The effect of the railing also is to keep passengers away from the fare box.

In a few special cases, as at ball grounds, the usual plan is reversed. Thus, when attendants at a ball ground are being taken away after the game the car is run pay-leave, although it may be going down town in the pay-enter direction.

The company has equipped four cars in this way, and the results so far have been very satisfactory.

Benefits of Subdividing Operating Expense Accounts

Experience of Eight Years with an Extensively Subdivided Series of Accounts Indicates a Number of Advantages for It—Through Its Use Specific Cost Figures for Any Purpose Are Always Available

By Clifford A. Elliott
Cost Engineer Pacific Electric Railway

THE instructions contained in the uniform system of accounts for electric railways prescribed by the Interstate Commerce Commission, effective July 1, 1914, say that any carrier or any receiver or operating trustee of any such carrier, in addition to the accounts prescribed by the commission, may, unless otherwise ordered, keep any temporary or experimental accounts the purpose of which is to develop the efficiency of operation, provided that such temporary or experimental accounts shall not impair the integrity of any primary account prescribed.

Possible subdivision of the primary accounts is indicated to some extent by the definitions in the I. C. C. classification, but it is left to each company to work out such details, if it desires to do so. To some persons any advantage in such a subdivision of the operating expense accounts may not be apparent, but the writer's familiarity with such a system, covering a period of eight years, shows that it has been desirable from the standpoint of all concerned.

Before this accounting system was adopted, considerable study and planning, as well as co-operation of all concerned, were required. All departments were called upon to submit a tentative schedule of what should be the proper number and titles of the proposed subdivisional accounts. Judgment in this respect rested in a majority of instances on experience as to what particular subheads were required under each account. In the way and structures accounts the department was thoroughly familiar with the most important subheads required.

The final draft of the schedule was the result of an elimination process, and the impression was general that too many subhead accounts would defeat the benefits to be derived from the system. If carried too far the division would entail a tedious volume of bookkeeping upon the auditor, as well as burden each department in determining the proper accounts for charges in documents prior to their transmittal to the accounting department for auditing.

The schedule herewith shows the subdivision of the operating expense accounts in Way and Structures for a Class "A" company with which the writer is familiar. The system is such as to benefit all departments concerned. This particular exhibit takes the reader only through the way and structures operating expense accounts, but the same efficient subdivision is likewise followed throughout the equipment, power, conducting transportation, traffic, etc., accounts.

The writer will now endeavor to point out some of the great advantages of this plan.

Advantages of the Subdivision

Of what benefit is a grand total statement of operating expenses to an operating official, month after month? The change in the total as between one month and another may be as much as $10,000, but if the official wants to know the reason for this variation, he must have a subdivision of the accounts. Take, for instance, the way and structures accounts. There is provided under each account a subdivision for municipal and legal requirements, and by adding up the total of each subdivisional account with this title the official may determine that at least 65 per cent of the way and structures expenses were attributed to this one cause. In other words, franchise requirements, which are an uncontrollable expense, caused the increase. Also, take into consideration the subdivision

of accounts for flood control. Large unforeseen expenditures may be incurred on this account.

Not only does this statement of the accounts, so subdivided, give the operating official a well analyzed lineup on his expenses, but it gives the engineer or superintendent of way and structures a system of figures whereby he may budget his way and structure expenses for subsequent months. Take, for instance, the subdivision account 8-g, "Removing grass and weeds." If the current month's expenses have exceeded the previous month to such extent that it has virtually robbed his department of allowances for more important maintenance work, the way engineer knows that in the subsequent months he can limit the amount of labor for weed extermination. The same principle applies to the various other labor accounts. Labor is the vital issue. Many times it will run 65 per cent of the expense.

The writer has also found this system of accounts of great help at the end of the fiscal year in summing up the expenses for a given class of maintenance work, such as the upkeep of road crossings, annual cost of flood control work, maintenance of automatic flagmen, block signals, pavement, switch lamps and targets, repairing of tools, etc. Take, for instance, the subdivision of accounts No. 16, "warning signals," or automatic flagmen. This subdivision is even carried out as between material and labor. As the number of these devices in operation is known, it is easy to find the average cost for both labor and material of their maintenance.

On all street railway properties also there is a large number of items of operating expense that are uncontrollable such as paving, maintaining road crossings, exterminating rodents, cutting grass and weeds by orders of municipalities, etc. This subdivision of accounts enables one to work out by percentages just what portion of the operating expenses are attributable to these sources.

Detailed Classification of Way and Structures Accounts

I. Track, Roadway and Buildings

1. Superintendence:
   (a) Salaries, maintenance engineer and clerks.
   (b) Salaries, supervising engineers.
   (c) Salaries, field engineering forces.
   (d) Salaries, draftsman.
   (e) Salaries, roadmasters and supervisors.
   (f) Miscellaneous supplies and expenses.
   Total superintendence.
2. Ballast:
   (a) Ordinary.
   (b) Municipal and legal requirements and property retired.
   Total ballast.
3. Ties:
   (a) Ordinary.
   (b) Municipal and legal requirements and property retired.
   Total ties.
4. Rails:
   (a) Ordinary.
   (b) Municipal and legal requirements and property retired.
   Total rails.
5. Rail fastenings and joints.
   (a) Ordinary.
   (b) Municipal and legal requirements and property retired.
   Total rail fastenings & joints.
6. Special work.
   (a) Crossings.
   (b) Other special work.
   (c) Municipal and legal requirements and property retired.
   Total special work.
7. Underground construction.
8. Track and roadway labor.
   (a) Surfacing and aligning track.
   (b) Unloading and laying ballast.
   (c) Unloading and laying ties.
   (d) Unloading and laying rail and rail fastenings.
   (e) Unloading and laying special work.
   (f) Inspecting and repairing switches.
   (g) Removing grass and weeds.
   (h) Cleaning tracks.
   (i) Patrolling, inspecting and watching tracks.
   (j) Repairing tools.
   (k) Rent of teams.
   (l) Wages trainmen — work train service.
   (m) Flood control.
   (n) Municipal and legal requirements and property retired.
   (o) Removing drift sand from tracks.
   (p) Miscellaneous track and roadway labor.
   Total track and roadway labor.
9. Miscellaneous track and roadway expenses.
   (a) Renewal roadway tools and material used in repairing tools.
   (b) Material and supplies for weed burner.
   (c) Miscellaneous material and supplies—flood control.
   (d) Section house and camp expenses.
   (e) Material used in repairing retaining walls, rip rap, etc.
   (f) Power and sundry expenses—work train.
   (g) Operation and maintenance of motor velocipedes and cars.
   (h) Miscellaneous material and expenses.
   (i) Municipal and legal requirements and property retired.
   Total miscellaneous track and roadway expenses.
10. Paving.
   (a) Payroll labor — asphalt and concrete paving.
   (b) Material — asphalt and concrete paving.
   (c) Payments to contractors—asphalt and concrete paving.
   (d) Payroll labor — oil macadam paving.
   (e) Material — oil macadam paving.
   (f) Payments to contractors—oil macadam paving.
   (g) Hire of teams and trucks.
   (h) Wages of trainmen, power, sundry expenses — work trains.
   (i) Paving tools.
   (j) Municipal and legal requirements and property retired.
   (k) Miscellaneous expenses.
   Total paving.
11. Cleaning and sanding track.
   (a) Oiling roadway.
   (b) Cleaning, greasing and sanding tracks
   (c) Municipal and legal requirements and property retired.
   Total cleaning and sanding track.
12. Removal of show and ice.
13. Tunnels and subways.
14. Elevated structures and foundations.
15. Bridges, trestles and culverts.
   (a) Bridges and trestles—labor.
   (b) Bridges and trestles—material.
   (c) Culverts.
   (d) Cleaning culverts and bridge channels.
   (e) Wages trainmen, power, etc., for work trains.
   (f) Repairs account floods.
   (g) Bridge tools.
   (h) Municipal and legal requirements and property retired.
   Total bridges, trestles and culverts.
16. Crossings, fences and signs.
   (a) Crossings—repairs and renewals.
   (b) Crossings—paving repairs and renewals.
   (c) Fences.
   (d) Warning signals—labor.
   (e) Warning signals — material and supplies.
   (f) Roadway signs.
   (g) Municipal and legal requirements and property retired.
   Total crossings, fences and signs.
17. Signal and interlocking apparatus.
   (a) Signal and interlocking buildings.
   (b) Tower operated-signal and interlocking apparatus — labor.
   (c) Tower operated-signal and interlocking apparatus—material.
   (d) Automatic block signal system—labor.
   (e) Automatic block signal system—material.
   (f) Signal light circuits.
   (g) Switch lamp and targets.
   (h) Municipal and legal requirements and property retired.
   (i) Miscellaneous.
   Total signal and interlocking apparatus.
19. Miscellaneous way expenses.
22. Distribution system (bonding).
   (h) Bonding—labor.
   (i) Bonding material.
   (j) Testing for defective bonds.
   (k) Wages trainmen, power, supplies, etc., bonding cars.
   (l) Municipal and legal requirements and property retired.
   Total bonding.
24. Buildings, fixtures and grounds.
   (a) Carhouses and shops.
   (b) General offices.
   (c) Station buildings and signs.
   (d) Landings and platforms.
   (e) Docks and wharves.
   (f) Moorings.
   (g) Grounds.
   (h) Section buildings.
   (i) Municipal and legal requirements and property retired.
   (j) Miscellaneous.
   Total buildings, fixtures and grounds.
28. Equalization — way and structures.
   Total way and structures — track roadway and buildings.

II. Electric Line

1. Superintendence.
   (g) Salaries electrical superintendent, assistants and clerks (proportion).
   (h) Salaries draftsmen (proportion).
   (i) Miscellaneous supplies and expenses — general office (proportion).
   Total superintendence — electric line.
18. Telephone and telegraph lines.
   (a) Labor.
   (b) Material.
   (c) Wages of trainmen, power and sundry expenses of work trains and line cars.
   (d) Municipal and legal requirements and property retired.
   Total telephone and telegraph lines.
20. Poles and fixtures.
   (a) Labor.
   (b) Material.
   (c) Wages of trainmen, power etc., work trains and line cars.
   (d) Municipal and legal requirements and property retired.
   Total poles and fixtures.
21. Underground conduits.
   (a) Ordinary.
   (b) Municipal and legal requirements and property retired.
   Total underground conduits.
22. Distribution system.
   (a) Overhead feeders—labor.
   (b) Overhead feeders—material.
   (c) Wages of trainmen, power, etc., work trains and line cars—feeders.
   (d) Overhead trolley labor.
   (e) Overhead trolley—material.
   (f) Wages of trainmen, power, etc., work trains and line cars—overhead.
   (g) Municipal and legal requirements and property retired.
   Total distribution system (except bonding).
23. Miscellaneous electric line expenses.
   (a) Expenses light and power department.
   (b) Miscellaneous.
   Total miscellaneous electric line expenses.
   Total way and structures—electric line.
   Total way and structures (excluding depreciation).

Crossing Protection on High-Speed Railway

Interurban Railway Connecting Indianapolis and Louisville Uses Flashing Lights Behind Hooded Lenses in Combination with Trembling Bell at Thirteen Intersections with Highway

THE Interstate Public Service Company operates high-speed interurban service between Indianapolis, Ind., and Louisville, Ky., over a 600-volt d.c. line, with overhead trolley. Speeds up to 70 m.p.h. are reached. Both trolley wheels and Miller shoes are employed as contact devices.

For the protection of the public, the company has installed at thirteen of its grade crossings with highways a type of signal comprising a 12-in. trembling bell in circuit with which are four 25-watt Mazda lamps that flash with the current fluctuations caused by the operation of the bell. Each lamp is placed at the focus of an 8-in. hooded lens, so that it is visible night and day. The signal is operated from the trolley wire.

The bell, group of hooded lamps and case containing the operating relays are mounted on a steel pole or standard, which in some cases has been painted in yellow and black stripes, as an experiment, in the hope of making the warning more impressive.

The halves of the light case containing the lenses are separately pivoted, so that one-half may be pointed or "focused" in one direction along the highway and the other in another direction which may be at any angle from the first. While the lamps in these cases are connected in series with the bell, a shunt is provided so that the burning out of a lamp does not open the operating circuit or stop the ringing of the bell, which will



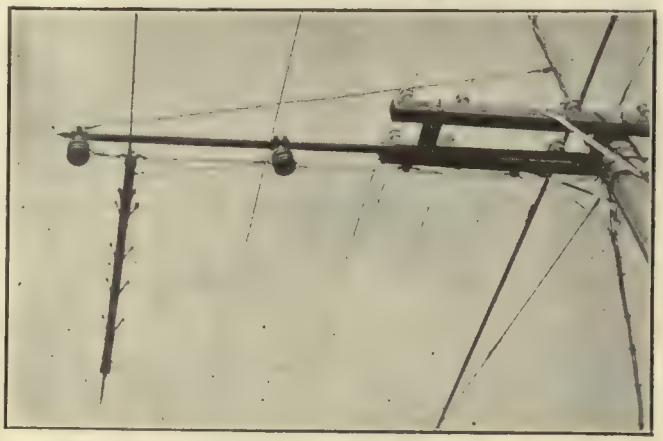
At Left, Crossing Signal at Marshfield, Ind., with Pivoted Light Cases and Off-Set Relay Box. At Right, Relay Board Complete for Single-Track Control, Removed from Relay Box

continue to give its warning even if all of the lamps are burned out.

A valuable feature of the Interstate Public Service installation is the motorman's indicator, which is installed three or four spans beyond the starting contactor. The indicator is one of the series of flashing lights. It is housed in a hooded light signal, mounted on a pole and "focused" so that the motorman will see it as he passes the contactor. The blinking of the light indicates that the bell is ringing.

The signal at Marshfield, shown in one of the illustrations, is one of those equipped with "overlapped stopping control." In this a unidirectional stopping contactor is located in the overhead a short distance each side of the crossing, the contactor on the far side operating to cut out the bell for each direction. Thus, when the car is held by an accident near the crossing, the bell will continue to ring.

The starting contactors are also unidirectional and



Spine Type of Overhead Trolley Contactor on Bracket Suspension at Memphis, Ind.

are located about 1,500 ft. on each side of the crossing. They operate to start the signal when the car is approaching the crossing, but are inoperative in the other direction.

One form of contactor used is known as the "spine" type, illustrated as installed at Memphis, Ind. This consists of two steel contact strips, supported on an insulating frame, so as to be wiped by the trolley wheel. Each strip has a phosphor-bronze spring forcing it against limit stops at four points along its length. The two strips are connected in multiple and insulated from the trolley wire. The lead runs off the binding post from these strips to the relay to be operated, and thence to ground. A car passing under the contactor diverts a transient current to operate the relay due to its trolley wheel bridging the wire with the strips. The strips are insulated at the middle, so as to give a sense of direction by the order in which the contact is made.

The impulse of current from the trolley contactor is received on a "last-position" relay. This is mounted in an iron relay box at a height convenient for inspection and maintenance. The door of the box is gasketed and padlocked. An accompanying illustration shows the relay board for single-track control and the form of last-position relay used. This is of the quick-acting type, with double-break contacts. The directional relay is mounted above it in the case. The incoming leads pass through disconnecting switches and fuses, so that the maintainer can work safely on the relay. Resistors and terminals are also mounted on the relay board, which is removable as a unit.

Of the crossings protected by the signals, twelve are single-track crossings and one is a double-track crossing. A number of the signals have been in operation for two years or more and have proved to be entirely reliable. They are Nachod automatic highway crossing signals of the BL type.



The "Box-Portable" in Action on United Electric Railway's Safety Car

Fare Collection at Providence

New Form of Portable Register Proves Well Adapted to Conditions on United Electric Railway's Property—Provision Is Made for Registering Both Cash and Token Fares

THE United Electric Railways, Providence, R. I., has for a number of years used the standard Rooke register in fare collection. This until recently has been a one-coin machine, so that when the fare of 6 cents was collected the passenger inserted a nickel in the register and handed the conductor the extra cent.

On Jan. 1, 1923, the railway put a reduced fare in operation by selling ten tokens for 50 cents, the cash fare remaining as before. This necessitated a new form of register, and the company adopted the type made by the Rooke Automatic Register Company, which has been used on a number of other properties during the past eighteen months. This is a modification of the previously standard Rooke register by means of which it is practicable to register nickels, dimes and tokens (or quarters). These are inserted in the same slot and registered on separate dials. The same principle can be applied to as high as four or more coins or combinations of coins and metal tickets properly registering on several totalizing counters.

R. R. Anderson, superintendent of transportation United Electric Railways, states that the use of these registers results in a uniform collection system and a uniform accounting system. This is highly desirable on account of the varied equipment operated by the company. The same register is used on cars operated one-man and two-man, the cars being of a number of types. There are pay-within, pay-enter, pay-leave and open-bench cars. In addition the company operates both city and suburban buses, on which the registers also are used. Another feature is the use of these registers for street collections.

On the suburban buses the tokens are not accepted, but the registers take quarters instead. The conductor's turn-in is based on a return of 5 cents for each point on the nickel dial and 25 cents for each point on the other.

For use on the one-man cars in Providence the Rooke people developed a simple "box-portable" which consists of a steel cash box mounted on a pipe standard and containing an inspection plate. An aperture in the side of the box receives the hand register, which, inserted in the aperture, is operated by a pedal. After registration the coins can be readily removed by the operator.

Among the railway properties besides the Providence company which are using the multiple-coin register are the Union Street Railway, New Bedford, Mass.; the Lehigh Traction Company, Hazleton, Pa., and more than a dozen others.

Livestock Transportation by Electric Railways

AN INTERESTING statement showing the growth of business in the handling of livestock by traction lines entering the Indianapolis Union Stockyards is included in a report by the traffic manager of the company. The statement covers January and February of this year and permits a comparison with previous traffic. In January this year 905 carloads of livestock were brought to the stockyards here by the traction companies compared to 511 for January a year ago. In February this year 773 carloads were handled compared to 364 carloads in February, 1921. Bert Henley, financial editor of the Indianapolis *Star*, writing on the growth of this feature of the traction freight business at Indianapolis, says:

> Statistics compiled by the Belt Railroad & Stock Yards Company reveal that the total amount of livestock handled by the interurbans in January and February of 1919 was 206 cars; in 1920, 267 cars; 799 in 1921; 875 in 1922, and 1,678 in 1923.
>
> These figures cover a period of the year when a seasonable falling off in receipts of livestock is to be expected, and can be taken as fairly representative of the year's traffic. Within the last year or eighteen months, all four of the large interurban companies have made many improvements and changes in order to develop the livestock line of their freight traffic. More changes are to be made during the present year, including purchase of rolling stock and equipment, the remodeling of old rolling stock; the construction of receiving pens at way stations.
>
> In order to facilitate prompt unloading and marketing of stock transported by electric interurbans the Belt Railroad & Stock Yards Company has provided greater switching facilities and extended the unloading platform and receiving pens.

Changes in Cost of Living Figures

THE U. S. Department of Labor, through the Bureau of Labor Statistics, has completed the compilations showing changes in the retail cost of food in twenty-two of the fifty-one cities included in the bureau's report.

From April 15, 1923, to May 15, 1923, fifteen of the twenty-two cities showed increases as follows: Philadelphia, 4 per cent; Baltimore, Bridgeport, Butte, Cleveland, Louisville, Norfolk, and San Francisco, 1 per cent. The following cities increased less than five-tenths of 1 per cent; Indianapolis, Little Rock, New Haven, Omaha, Pittsburgh, Portland, Me., and Providence. There was a decrease in five cities, i.e., Memphis and Newark, 1 per cent, and Buffalo, Fall River, and Manchester less than five-tenths of 1 per cent. Boston and Richmond remained the same. For the year, May 15, 1922, to May 15, 1923, twenty-one of the twenty-two cities showed increases. Bridgeport was the highest with 8 per cent. Richmond was the only one which decreased, its reduction being less than five-tenths of 1 per cent.

Track Notes from Detroit

Special Trackwork Is Laid on Wood Ties for Ease in Replacement—Cause of Corrugation Is Being Investigated

THE standard system of track construction in Detroit was described in the issue of this paper for July 23, 1921. Briefly, it consists of 100 lb. A. R. A. plain girder rail on International steel ties laid in concrete, which is carried up over the ties and about 1 in. up on the rail. After this concrete bed has set, the remainder of the trench up to the level of the rails is filled with crushed granite, which is crowned between the rails. This is rolled and then filled with rich cement grout and rolled again.

For special trackwork, wooden ties are used instead of the monolithic construction so that parts can be more easily replaced. Broken stone is used under and between the ties, and granite, tarvia and other materials have been used for paving. The bolts for the angle plates and tie rods are spot welded. At present manganese insert special trackwork is being employed, but the tendency is to work toward solid special trackwork of manganese steel or other alloy.

The accompanying engraving shows a typical cross-section of track for special work with sloped base, used by the Department of Street Railways, Detroit.

Very much attention has been given to the study of corrugation, as considerable of this trouble has developed in the 100-lb. A. R. A. rail, which the company has laid. Formerly corrugation had been noticed particularly on sections of the track where the cars are braked to a stop and on down grades, but on the new 100-lb. rail it is quite continuous.

An interesting experiment was tried to determine whether the cause was in the rail or in the type of foundation. Detroit has a short section of open tangent track laid on oak ties with stone ballast and the joints not welded. The 80-lb. rail used in this track has not shown corrugation. Four lengths of it were taken up and the same lengths of the 100-lb. rail were put in, and they developed corrugation as rapidly as in the monolithic construction.

Corrugation rarely develops in two-way track, but it seems always to develop in one-way track, and the theory now held by P. A. Kerwin, superintendent of tracks, is that it is a movement of the metal in the head of the rail produced by the same forces which cause steam railroad rails to creep. As the street railway rail is held so tightly that it cannot creep, the movement has to take place in the metal in the head of the rail.

One peculiar feature of all of the corrugations found in the recently laid 100-lb. rail is that they are about 2 in. in length. In some cases where corrugations have developed in older rails, they have been 4 in. and sometimes 6 in. in length.

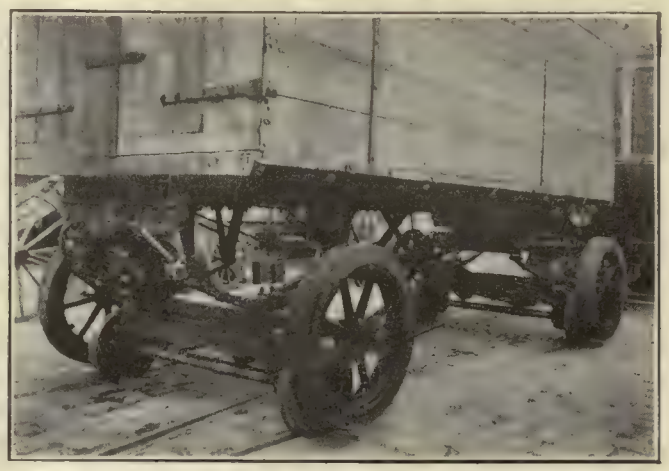
The Readers' Forum

A Wagon with Auxiliary Flanged Wheels

VIENNA, AUSTRIA, May 10, 1923.

To the Editors:

I have noted with interest the article in the Jan. 6 issue of the ELECTRIC RAILWAY JOURNAL, page 49, entitled "Hauling Wagons with Electric Cars." The device described in this article was first used in Düsseldorf, Germany. A similar device has been constructed and tried out by the city electric railway in Vienna, as shown in the accompanying illustration. Trail trips made with this car have proved satisfactory, but no decision has been reached as to its general introduction.

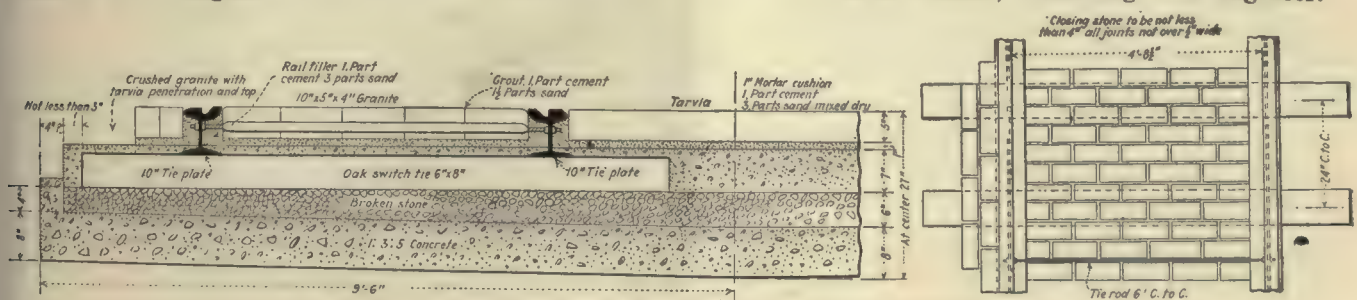


Postal Trail Car Mounted on Auxiliary Trucks to Permit Use on Electric Railway Tracks

The illustrations show a trail car of about 11,000 lb. weight, constructed in accordance with the Büssing system. When the trailer is to be run on the railway tracks, a small, single-axle truck is slipped under each trailer axle. Unlike the four-axle auxiliary truck used and illustrated in the ELECTRIC RAILWAY JOURNAL article, this one does not need to be carried around with the trailer, but can easily be removed and set aside.

In the use of the newer auxiliary truck, the car needs to be lifted only a short distance onto the truck, just enough to provide clearance between the rubber-tired wheels and the paving. The trailer is lifted a sufficient distance to admit the auxiliary truck by running the rubber-tired wheels up a pair of light wooden inclines placed outside the rails. The auxiliary trucks are held in place by means of pins by which they are attached to an angle iron mounted under the body. This requires but a few minutes. One of the auxiliary trucks weighs about 670 lb., and a pair will carry about 17,500 lb.

FRANZ SCHREY, Consulting Civil Engineer.



Section of Roadbed with Sloped Base for Special Trackwork in Detroit

Association News & Discussions

Human Maintenance in Industry*

BY ALDEN COFFEY, M.D.
Fort Worth, Tex.

THE value of human maintenance to any industry is just as great as the maintenance of machinery, for an expensive machine would not be used night and day without periodically inspecting it to repair damaged parts before it is injured, and the employee should be given the same character of inspection.

The benefits and influences of a thorough human maintenance department are so great that it is impossible to estimate its value. The cost of such can be ascertained exactly, but the monetary returns cannot be determined. How could one estimate the financial gain due to the increased efficiency of an employee who has for years been below par because of some chronic ailment which was discovered by periodical examinations and removed, thereby restoring the man to his full producing capacity?

The work covered by a human maintenance department should consist of the following:

1. Examination of applicants for employment.
2. A periodical examination of employees.
3. Treating the sick and injured.
4. Preventive medicine.
5. Emergency service to the injured.

The examination of applicants for employment is most important. The only proper time for such an examination is before the beginning of employment. It assists materially in the proper placing of applicants. It should be able to show the class and character of the work for which the applicant is best suited. It determines the ability of the individual to meet the public and to get along peacefully with his fellow workmen.

Periodical examination should be made of all the employees at least once a year, extending from the manager to the lowest employee. It should consist of taking blood pressure, examination of urine and a thorough physical examination. This will enable the medical department to render better service, and often will disclose the cause of many accidents.

Treating the employees in the time of sickness and injury enables them to have medical service when in a great many instances they otherwise would hesitate to call a physician on account of the expense, and they and the company would lose in the time away from their work.

Preventive medicine is the duty of the medical department. In the prevention of diseases it would be necessary to look after the sanitation and general working conditions of the shops and use proper preventive measures for the spread of infectious diseases. Look into the environments of the home life and teach the employees the proper care of the body.

Many injuries which seem to be of minor importance, unless properly treated at the time of occurrence, may later become infected, in some instances producing a great loss of time, or possibly permanent disability. Prompt attention relieves a great deal of suffering and sometimes saves lives.

The advantage of a health maintenance department to the employer are as follows:

1. Increases output by having a steadier working force.
2. Decreases cost of training new employees.
3. Increases efficiency of the employer's service to the public.
4. Secures the good will of the employees.
5. Increases the proportion of old employees, with their gradually increasing value.
6. Reduces compensation for accidents resulting in deformity and death.

The advantages of a health maintenance department to the employee are as follows:

1. Properly places employees according to physical ability and condition.
2. Furnishes better medical and surgical service.
3. Prevents accidents to himself or fellow workman.
4. Reduces permanent disability.
5. Protects from infections or contagious diseases.
6. Prevents loss by finding focal infections.
7. Discovers diseases early.

The health maintenance department increases the output of the man by keeping him well, so that he can work, say, from 75 to 90 per cent of his time, as compared with 25 to 50 per cent of his time when his health is poor. This is a great advantage both to the company and to the man himself. The cost of training new employees is decreased, since with better health there are fewer changes. The loss in the time it takes to develop a new employee is greater than can possibly be the health maintenance of several men.

The efficiency of the company's service to the public is increased, because the employees are better able to handle the public by meeting them in a pleasant attitude, which they could not do if they were ailing or were suffering from hidden diseases. The spread of infectious diseases among employees and from them to the public is prevented.

By properly placing each employee according to his physical ability to serve, he is enabled to work without being handicapped by some infirmity that would prevent his advancement. Likewise the proportion of older employees will be increased, and their value to the company and to themselves will be gradually growing greater. By properly protecting the employees' health his expectancy of age will be increased materially, making it possible to increase his years of service.

Proper care of those injured should result in quicker recovery, reducing the amount of compensation very materially, due both to the decreased time required for healing and to the reduction in the number of deformities and permanent disabilities that usually follow injuries. Death cases can be reduced to a minimum in many instances, provided the injury is handled properly and with the least delay after its occurrence.

*Abstract of an address before the street and interurban railway section of the Southwestern Public Service Association, Fort Worth, Tex., May 16.

City Officials Hear About Railways' Paving Problems

SPEAKING before the engineers' section of the conference of Mayors and city officials held at Buffalo on June 13, H. H. George, engineer maintenance of way Public Service Railway, drew attention to the impracticability of preparing a definite specification for street railway track construction which would be suitable for all conditions.

He spoke also on the need of closer co-operation between municipal and utility engineers in relation to the location of surface and underground work. Sewers, water, electricity, gas, telephone, steam mains and sometimes mail tubes occupy space and require frequent service connections to the adjacent structures along the street. Some streets also carry exceedingly large trunk sewers and water mains which are frequently independent of the regular local mains. Practically all of these utilities have manholes and valve boxes which extend to the surface at frequent intervals and these often form quite a collection at street intersections. Instances have been noted of

as many as eleven manhole covers at one location within the confines of two 50-ft. intersecting streets. When there are many manhole heads in the vicinity of the car track, curves and special trackwork it becomes a nice problem to design tracks to dodge them, and their presence usually causes great difficulty in properly constructing and maintaining the tracks and track pavement.

Concerning the paving obligations of street railways, Mr. George said that the only justifiable basis for the imposition of the paving impost disappeared with the horse cars; the companies today pave and maintain a right-of-way merely because, when the change was made from the horse-drawn vehicles to electrical propulsion, no consideration was given to changed conditions as far as the resultant wear on pavement was concerned. The question of relief from the paving burden is a vital one to the street railway industry. Relief has been granted in a certain relatively small number of cases through special legislation. A good beginning has been made and the sentiment for complete relief is gaining ground among thoughtful people. It would appear to be high time that laws making burdensome paving requirements on the street railway companies should be repealed and the justice of the street railway's claim for relief from the responsibility for paving expense recognized and this burden placed where it properly belongs.

American Association News

Heavy Traction

THE heavy traction committee met at New York on June 13. The members present were: A. H. Armstrong, J. M. Bosenbury, H. W. Cope, J. C. Davidson, Mr. Chase (representing J. V. B. Duer), N. Litchfield, L. B. Wells and Sidney Withington, chairman.

The draft of the proposed annual report was carefully reviewed and discussed in detail. The committee members were requested to make suggestions of men who may discuss it at the annual meeting. Suggestions were also requested for activities of the committee for the coming year.

Collection of data which has not yet been completed includes information on electric locomotives below 80 tons weight for industrial purposes and which conform to the M. C. B. standard.

It is understood that a committee of the Association of Railway Electrical Engineers is to study self-propelled car operation. To avoid duplication of effort it was the consensus of opinion that the data collected on this subject be sent to the A.R.E.E. committee of the association interested, with the understanding that the American Electric Railway Association will receive the benefit of any information which may be collected by the A.R.E.E.

A letter from H. A. Johnson, sponsor, was read in connection with the presentation to the American Engineering Standards Committee of subjects for national standardization. Since these standards primarily concern steam railroads it was held that any presentation to the A.E.S.C. would come more appropriately from the A.R.A. rather than from this association.

Preparing for Atlantic City Exhibit

AT THE time this paper went to press there were applications for more space for exhibits at the annual convention than at the corresponding period in 1919, 1920 or 1922. There was no exhibit in 1921. The application blanks went out to manufacturer members the first part of the month. They called for the usual particulars of space required, dimensions of the largest piece to be shipped, weight of the heaviest pieces, total weight of exhibit, needs in the way of steam, electric power, compressed air, etc., with the regulations adopted by the exhibit committee to govern exhibits at the convention. The chairman of the exhibit committee this year is L. W. Shugg of the General Electric Company, and Fred C. J. Dell is director of exhibits, with headquarters at the association office, 8 West Fortieth Street.

It is the intention of the exhibit committee to allot space shortly after July 1 on all applications received up to that date. To all applications received after July 1 space will be allotted in the order in which they are received.

Wood Preservation

A STEP toward the eventual establishment of uniform specifications for methods of wood preservation was taken at a meeting of the special committee on wood preservation of the Engineering Association in New York on June 15. A report on specifications for brush treatment of poles was submitted. Discussion was held as to the maximum temperature at which the oil should be applied for unseasoned timber and a suggestion was made that the temperature be raised to about 250 deg. F. It was brought out in the discussion that the bristles in the brushes used would not stand up at such a high temperature.

The extent to which non-seasoned timbers, and seasoned timber which has been made wet by rain, would respond to preservative treatment was also discussed. It was brought out that some wood case-hardens on seasoning and will take treatment better if moistened slightly before the application of a preservative. A. P. Way raised a question as to the desirability of recommending the use of grade 1 coal tar creosote oil for the brush treatment of timber. The committee was of the opinion, however, that this grade of oil was not suitable for brush treatment, but thought it would be desirable to recommend that next year's committee prepare specifications for a type of oil for brush treatments.

Specifications for open tank treatment of poles was the subject of a report submitted by E. F. Hartmann. There was a discussion concerning the result obtained by treating unseasoned or green poles by the open-tank method. A report on specifications for pressure treatment for pine poles was submitted by C. A. Smith. It was thought that these specifications should include the use of grade 2, as well as grade 1, coal tar creosote oil for this purpose, and that the range of temperature of the oil should agree with the existing specifications for treatment of ties and dimension timber.

Because specifications for pressure treatment of poles have not yet been adopted as standard by the American Wood Preservers' Association, the report of this committee was accepted for information only. It was thought that the existing specifications for the purpose of treating crossarms were entirely suitable, and nothing further was done along this line. The perforation process for timber treatment was discussed. A historical sketch, consisting of a review of existing specifications, was presented.

Those present at the meeting were H. H. George, chairman; A. P. Way, M. J. Curtin, W. H. Fulweiler, E. F. Hartmann, E. L. Morier and C. A. Smith.

Joint Committee on Engineering Accounting

A MEETING of the joint committee of the Accounting and Engineering Associations to study the subject of engineering accounting was held at association headquarters on June 15. Those in attendance representing the Accountants' Association were G. F. Dineen, Holyoke, and J. E. Heberle, Washington, while L. R. Brown, Rochester, and E. D. Dreyfus, Pittsburgh, represented the engineering members of the committee.

The study of the committee this year will be the drafting of a suggested classification of detailed accounts in the standard classification for the benefit of those companies which, on account of their size, find it convenient to divide their accounts to a greater extent than is called for in the standard classification. Under the rules of the Interstate Commerce Commission, companies are permitted to do this providing they make no change in the accounts called for in the classification.

It was found that a number of companies have been subdividing the I. C. C. accounts to a considerable extent, and it is hoped that through the work of the committee a more scientific method of following this practice will be available for those companies that wish to adopt it.

The work of the committee last week was devoted largely to reviewing suggested subdivisions of the way and structures capital account, or accounts 501 to 550, inclusive.

Maintenance of Equipment

Convenient Commutator Slotter

A COMMUTATOR slotter that provides for both vertical and horizontal adjustment of the armature has been constructed in the shops of the Lehigh Valley Transit Company, Allentown, Pa. It is mounted on a bedwork frame and has a wooden framework at the operating end, for supporting the operating mechanism, and a strap-iron mounting at the pinion end, constructed of 4-in. x 1-in. iron. The slotting saw is driven by



Home-Made Commutator Slotter

a belt from a 1-hp., 110-volt, 60-cycle motor, which is mounted on the bedplate. The framework for the shaft which carries the slotting saw slides on two 1-in. rods and is moved back and forth to cut the slot by a lever at the outside end. Two vertical rods threaded at the upper ends provide for adjustment of the saw in a vertical direction so as to accommodate commutators of different size.

The armature shaft fits into wooden saddles, which can be raised and lowered by means of screws. Sidewise adjustment of one end of the armature is provided by moving the supports, which are clamped in position by bolts. Thus, commutators which are somewhat out of alignment can be set so as to cut an accurate slot and not leave any mica on the side, or cut away an excessive amount of the copper. A 1-in. pipe supports a lamp for the convenience of the operator and a hose connection is provided for blowing away the particles of copper dust. A jib crane mounted on an adjacent post is used for handling armatures into and out of the slotting machine.

Table of Bushing and Pin Data Helps Repairmen

IN ORDER that the shopmen may know exactly the dimensions of parts required in making repairs, the San Antonio Public Service Company has prepared a table which shows the sizes of bushings and pins used on its various equipment of railway cars.

Each type of car is classified separately by the builder's name and series numbers. The apparatus in which pins and bushings are used is listed, and on the same line are given the dimensions of the several parts, and the stock names. This table, which is posted where it will be always available to shopmen, is convenient in making out storeroom requisitions.

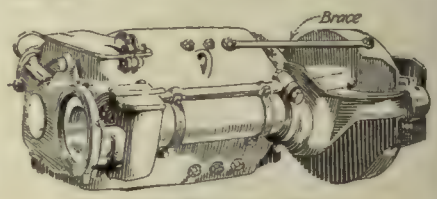
The left-hand columns of the table show the sizes of bushings and pins in stock, and at the right are given the number required per car. It enables the workman to get the correct size from the stock room the first time and insures the use of bushings and pins of the right size.

ST LOUIS CARS 285-299									
SIZE OF BUSHING STOCK					BUSHINGS			PINS	
Inside Diam Ins.	Length Ins.	Outside Diam Ins.	Name		Number per Car	Number Cars	Total	Pin Diam.	Pin Length
19/64	3/4	13/8	M	Air cylinder ram	2	15	30	1 1/8	3
19/64	1	13/8		Floating lever at ram end	6	15	90	1 1/8	3
19/64	3/4	13/8	M	Tie between dead and floating levers at cylinder	4	15	60	1 1/8	3
19/64	3/4	13/8	M	Air pull rod clevis cylinder end	4	15	60	1 1/8	3
1 1/64	1	1 1/4	I	Vertical floating lever	12	15	180	1	2 5/8
1 1/64	5/8	1 1/4	F	Connecting link between vertical floating lever and breakbeam bushed in vertical lever only	16	15	240	1	2 5/8
1 1/64	1	1 1/4	I	Brakebeam bushed on each end	6	15	90	1	2 5/8
1 1/64	1/2	1 1/4	E	Fulcrum pin support of vertical lever	8	15	120	1	2 5/8
1 1/64	5/8	1 1/4	F	Adjusting clevis or jaw	16	15	240	1	2 5/8
1 1/64	1	1 1/4	I	Adjusting eyebolt	4	15	60	1	2 5/8
1 1/64	5/8	1 1/4	F	Breakshoe head (lower hole)	8	15	120	1	2 5/8
57/64	3/4	1 1/8	C	Breakshoe head (upper hole)	8	15	120	7/8	3
57/64	3/4	1 1/8	C	Brake hanger links	8	15	120	7/8	3
57/64	3/4	1 1/8	C	Supporting casting engaging brake hanger links	8	15	120	7/8	3
				AMERICAN CARS 270-284					
19/64	1	13/8		Floating lever at cylinder stock	3	15	45	1 1/8	3
19/64	3/4	13/8	M	Ram in air cylinder	2	15	30	1 1/8	
19/64	5/8	13/8	L	Tie rod between floating and dead levers not bushed on dead lever ends	2	15	30	1 1/8	2 1/4-2 3/4
19/64	7/8	13/8	N	Air pulls rod on air cylinder end	2	15	30	1 1/8	4 3/4

This Table of Bushing and Pin Data Aids San Antonio Shopmen

Brace Holds Gear Case in Alignment

A DIFFICULTY frequently experienced, especially with older types of railway motors, is tilting of the gear case away from the perpendicular. This is because the case is not anchored to the motor frame with sufficient rigidity. Continuous vibration loosens the bolts, after which the finished surfaces rub and wear, so that a tight fit is impossible. The gear case then tilts until the



The Brace Prevents Vibration of the Gear Case

side clearance from the gear is gone, and the gear cuts through the thin metal, making a hole in the side.

To prevent this difficulty the West Penn Railways, Connellsville, Pa., has designed a brace that connects the top of the gear case to the motor frame. This consists of a 1-in. round bar, upset on the ends to provide bosses. One end is fastened beneath one of the pole-piece bolts, and the other to the top of the gear case. The brace entirely prevents the trouble, since vibration cannot move the gear to produce rubbing.

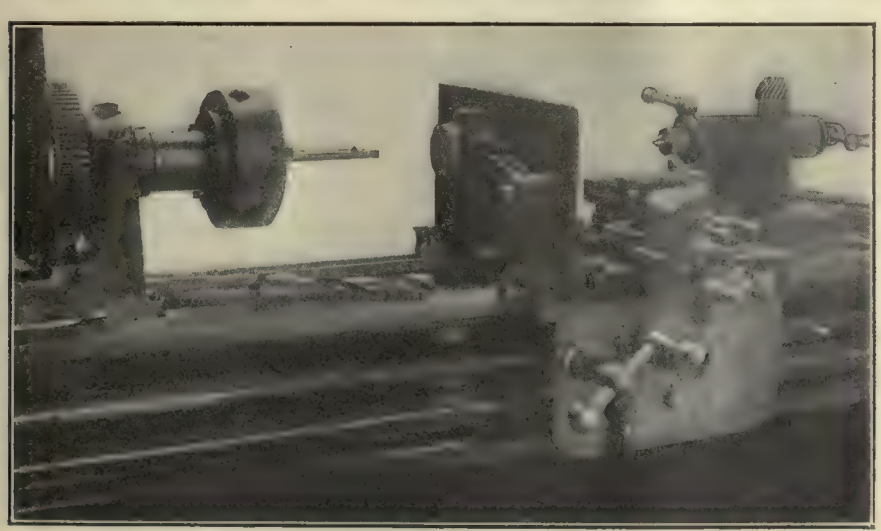
Trimming Springs with Acetylene Torch

WHEN leaf springs are made in the ordinary forge shop to replace broken springs, or when broken springs are welded, it is necessary to bend the ends exactly to size to give the correct length and to fit the suspension hanger pins. Since on repair work it is not always possible to determine beforehand the exact amount of material needed, there is usually a small surplus which must be trimmed off to make a correct fit. This is frequently done with a hot cutter on the anvil.

The West Penn Railways, Connellsville, Pa., has adopted a practice which is simple and effective. The spring is made exact to size in a jig and the ends bent over to form the link. The surplus metal is then cut off by means of the acetylene torch. This is done while the spring is still in the forge shop, and since there is no hammering, there is no chance for the spring to get out of shape. The metal is cut off cleanly, and the entire operation takes only from two to five minutes.

Finishing Connecting Rods in Small Lathe

THE accompanying illustration shows the fixtures used for finishing connecting rods for compressors in a small lathe at the Fairview shops of the Lehigh Valley Transit Company. The usual plan would be for such a piece to be held in the headstock of the lathe and rotated, but the lathe used in this case is not large enough to swing the connecting rod, so this is held stationary on a jig bolted to the carriage of the lathe and the cutting tool is rotated. The accompanying illustration shows a connecting rod in position for finishing. It is fastened to the face of a jig of L section by means of clamps with two bolts on either side of the rod. A pin projects from the jig to receive the finished part of the rod. The plate used has a base 2 in. wide to provide for fastening securely to the carriage of the lathe. It is 11 in. high at the base and ½ in. thick. After the connecting rods have been babbitted, the bearing surface is first drilled out and finished with a boring bar. The outside portions of the rod are finished with a tool rotating with the spindle of the lathe.

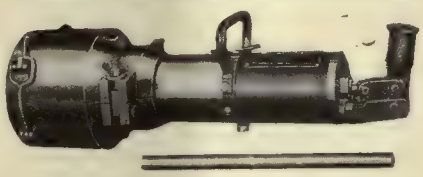


Finishing Connecting Rods for Compressors in a Small Lathe

New Equipment Available

Hydraulic Pinion Puller

THE accompanying illustration shows the Peerless hydraulic pinion puller, a new specialty being marketed by the Electric Service Supplies Company, Philadelphia. This device is designed to remove pinions from railway armature shafts quickly. It is of light weight so that it readily can be carried to the armature or motor from which the pinion is to be removed. It clamps over the end of the pinion, and since it pulls in a straight line it can be applied to the shaft without removing the armature from the motor.



Portable Hydraulic Pinion Puller

The action is hydraulic, oil being used as the medium for producing the pressure. This is pumped up by means of a hand lever at the end of the pinion puller. Six sizes of jaws furnish a means of fitting pinions ranging from a minimum diameter of 2¾ in. up to a maximum of 9 in. The jaws consist of two heavy steel castings, held together by quick-action clamps. The inside face is machined so as to take care of variations between new and badly worn pinions. The device complete weighs approximately 50 lb., and is supplied with a handle for convenience in carrying.

Lights Only Indication in New Signal

A SIGNAL in which the indications are given only by colored lights has been developed by the Chapman Electric Railway Signal Company. The separation of the indicating lenses from the operating mechanism is a feature of the apparatus. This permits each to be placed in any desirable location. The case containing the operating mechanism can be placed low on the pole, where it may be inspected and worked on by any one standing on the ground, and the case containing the colored lenses and lamps in a position most easily seen by the motorman.



The Lenses Are Separate from the Operating Mechanism in This Signal

The indicating cases are each fitted with two 6⅜-in. diameter lenses, one of which, when the lamp back of it is lighted, will show red and the other, when its lamp is lighted, will show green. The lenses are so fitted that they will not give the appearance of being lighted when the sun shines on them. Behind each lens there are two 50-watt lamps, each on a different circuit, so that the failure of one lamp does

not put out the other. All lamps are on circuits separate from the magnets of the operating mechanism.

The operation of the signal is as follows: When a car approaches the signal and the motorman finds it unlighted, he will understand that there is no car in the block. The car thereupon proceeds and as it passes the contactor a green light appears at the near end of the block and a red light at the remote end.

The motorman of a car approaching a signal which is displaying a green light will understand that another car, moving in the same direction, has preceded it into the block. As it proceeds under the contactor, the green light will momentarily disappear, the red light will momentarily be lighted and disappear, and the green come back permanently. The car may then pass the signal. Unless this series of operations, which shows that the car has counted itself into the block, takes place, the car should not proceed. When all cars that have entered the block have passed the clearing contactors at the leaving end, signals will return to their normal, non-lighted condition.

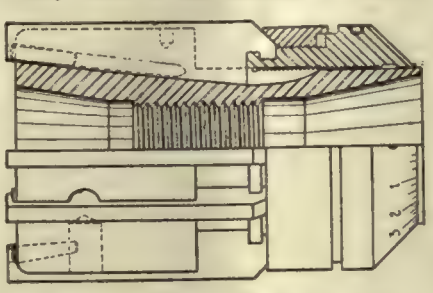
Roller Bearings Applied to Turntables

APROPOS of the interest in roller bearings in connection with electric and steam railway rolling stock, the recent construction of a turntable for the Canadian National Railways by the Dominion Bridge Company of Montreal is of particular interest.

This is an 85-ft. twin span turntable, equipped with Stafford roller bearings, 5 in. x 9 in. in size. Each bearing is subjected to 48,000 lb. impact load when a locomotive of the maximum weight for which the turntable is designed comes upon the table. The rollers are arranged in two races, staggered, eliminating the continual raising of the load as each roller approaches the crown of the bearing. The turntable is equipped with a 15-hp. motor, whereas, it is said, a 30-hp. motor would be required for operation with friction journal bearings. In addition to their low friction, the roller bearings have the advantage that they require no more power in winter than in summer, as the lubrication resistance is done away with.

New Line of Expansion Reamers

THE Davis Boring Tool Company, St. Louis, Mo., is placing on the market a new line of expansion reamers. Provision is made for rapid adjustment without the necessity of circular grinding, and individual blade screws are eliminated for holding the reamer blades in the body. The blades are firmly held in the reamer by means



Shell Type Expansion Reamer with Micrometer Dial

of hard taper pins, whose holding power is many times greater than the type of screws ordinarily used. The entire length of the hard taper pin is in contact with the notch in the blade, thus holding it rigidly in the bottom of the slot without interfering with the free movement of the blades for adjustment. The only time that it is necessary to release the taper pin is for replacement of the blade.

In replacing blades, the taper pins are driven out by means of a special drift inserted in "knock-out" holes. When the blades reach their limit of utility in one reamer, they are interchangeable in smaller sizes.

So as to meet various conditions, the expansion reamers are furnished in three types. Group 1 reamers are of superior quality and the methods of expanding and contracting the blades on the taper is by means of a positive micrometer dial graduated in one-quarter thousands. All threads are covered and protected. The taper drive and the internal thread hold the pilot or driving arbor in true alignment.

Group 2 reamers include those designed for shops where a moderate price tool is desired. It employs the forward movement of blades on a taper with the blades advanced and securely held with hardened taper pins. Rigid locking is obtained with a hardened locknut reinforced by a hardened jam nut. The driving arrangement is simple and requires only an ordinary arbor which can be purchased with the reamer if desired at a very low cost. Group 3 reamers are simple in construction and inexpensive, and are designed for withstanding hard usage. They can be used to advantage in boring as well as reaming. The expansion is by blades held by taper pins in the same manner as for Groups 1 and 2.

Automatic Window Cleaner

THE Folberth Auto Specialty Company, Cleveland, Ohio, announces the installation of its automatic windshield cleaners on the cars of the Cleveland and Louisville railways. This cleaner consists of a long wiper arm to which is affixed a rubber cleaning blade. The arm is caused to oscillate back and forth by a piston in an air cylinder fastened to the top of the window. The air cylinder is connected directly to the air line on the car, a small reducing valve being located between the cylinder and the air line connection. The cleaner can be operated



Window Cleaner Installed on Cleveland Car

on from 4 to 200 lb. air pressure and can be adjusted to any uniform speed desired.

The Folberth automatic windshield cleaner has been used quite extensively on automobiles, and its new use in electric railway service requires but few changes. A longer and heavier wiper arm with rubber cleaner blade is used and a heavier boss for supporting the driving shaft. Some changes in the interior mechanism have also been made, in order to adapt the piston head and valves for working on air pressure instead of on vacuum as developed by the suction of the automobile motor.

The News of the Industry

No Service in Frankfort

Capital of Kentucky Loses Railway Service Because of Unwillingness to Approve Franchise Renewal

Frankfort, the state capital of Kentucky, has been without trolley service since June 5, on which date the franchise of the Kentucky Traction & Terminal Company expired. The question of the renewal of the contract had previously been taken up with the local Chamber of Commerce to see if a franchise could be worked out that would be worth while submitting to the City Council. Three open meetings were held at which several city officials were present. The company's operating statements showed that operations at a 5-cent fare had caused $12,000 to $15,000 annual loss. The 6-cent fare allowed during the war period was disallowed fifteen months ago.

Can Not Operate at a Loss

The company told the citizens that operations would be continued if it could be done without loss. It was willing to waive any claim to a profit. It also agreed to operate under a franchise which the city might draw up, if the company was relieved of paving cost and maintenance of track excepting rails, ties, joints, etc., making up the track structure proper. The desire was for a twenty-year contract subject to discontinuance of operation on thirty days notice from either party. It was to be understood that, under this franchise, the company would assume the obligation of repairing all paving injured through carrying on its own construction work.

At the last meeting of the City Council in May the company proposed an ordinance to continue service thirty days under the terms just mentioned and at a 7-cent fare. The Council proposed an ordinance authorizing continuation of service for thirty days under the old terms of a 5-cent fare and the usual paving obligation. The company refused.

The same night the Council introduced a resolution calling for paving of certain streets in the city. Under the resolution property owners were to pay for paving from curb to track, the city to pave the street intersection and in and between the tracks. The city was to pay for all paving cost of the track, but not for rails, ties, joints, etc. The idea of this resolution was to bring a test case to determine whether the statutes of the State of Kentucky can relieve a company of the paving obligation in making a new franchise contract. No such paving case has heretofore come up for settlement. Whatever procedure is adopted by a city must continue for ten years, and the state law provides that a city must reserve the right to cause the traction company to pave between and 18 in. outside the tracks.

It is the exact interpretation of what a city "may" do under this law that remains to be settled. Where an agreement already covers obligations regarding the track paving the Railroad Commission cannot relieve the company of obligations under the agreement. As the Court of Appeals has not yet passed on the law the whole matter is in the air.

Only two out of 257 people approached refused to sign a petition asking the company to restore service.

The Frankfort Bus & Truck Line Company, with two regular buses and one spare, has been trying to serve Frankfort's population of 10,000. It started operation on June 11 with a 5-cent fare, but after five days went to 10 cents, with four tickets for 25 cents.

Chicago Wage Arbitration Hearings to Begin June 25

Arbitration of the wage dispute between the Chicago Surface Lines and the Chicago Elevated Railroads and their employees will begin on June 25. Hearings before the arbitration boards probably will be held in the City Council chambers in the city hall and will be open to the public.

The arbitrators chosen at a joint conference of the interested parties and Mayor Dever in his office in the city hall are:

For the public, Francis X. Busch, corporation counsel of the city of Chicago. He was named by Mayor Dever as the umpire or "third man" on the boards and his selection was approved by both sides.

For the unions, Maclay Hoyne, former state's attorney. He served on the arbitration board that settled the wage controversy after the strike of 1915.

For the surface lines, James M. Sheean, attorney. He likewise served as a member of the board in 1915.

For the elevated railroads, William A. Morrow, attorney.

The cases of the surface and elevated employees will be heard separately. Corporation Counsel Busch, as "umpire," will sit on both boards and Mr. Hoyne, representing the union men, will also serve on both boards.

Both sides signed an agreement to abide by the awards of the arbiters. The wage scale fixed will run for two years from June 1.

Home Rule Campaign Fails

Despite Governor's Urging Legislators of Tennessee Reject Proposal to Restore Local Control

The effort in Tennessee to abolish the Public Utilities Commission is quiescent for a time, but is by no means dead. This is the opinion of observers of the recent attack on the utilities law in the sixty-third Legislature.

The move to abolish the commission and to return to home rule was urged by Governor Alf Taylor, the Republican incumbent, before the session of the Legislature two years ago and became one of his principal campaign points in offering himself for re-election. On the eve of the November election of 1922, Governor Taylor was most pronounced in declaring he would force the repeal of the act. He accused his Democratic opponent, Austin Peay, Clarksville, of evading the issue. The Governor's boast was that he would restore to the municipalities their right to enter into contract.

Governor Taylor went down to defeat as did also one of Governor Taylor's appointees to the commission, W. N. Beasley, Halls, who during the election campaign promised to lower all the utility rates in the state to pre-war levels.

Commission Issue Raised Again

With Governor Taylor's defeat and the inauguration of Governor Peay, the public utilities act became a renewed issue when the new Governor in his inaugural speech repeated his pledge to restore the right to contract to the municipalities of the State.

While bills looking toward this end were introduced in both houses of the Legislature in the first week of the session, no action was taken on the floor of either house until after the recess. As the Tennessee Legislature convenes for only seventy-five days, all discussion of public utility matters came in the closing days of the session.

Immediately on the recommendation of the Legislature, Governor Peay summoned the city officials of the nine larger cities of the State to learn their views on the present utility act, and he formulated his program accordingly. There was, of course, a conflict of opinion among the municipal officers as to what would be best or how state authority could be asserted over the utilities in event the act was repealed. On the adjournment of this conference Governor Peay announced that there had been a unanimous declaration for the repeal of the act, and that a committee had been delegated to draw up a

measure to this end. When Governor Peay reassembled the city officials, however, more than a score of cities protested against the repeal of the act, saying that they had found the Public Utilities Commission of the greatest benefit and help in regulating their utility affairs.

Despite this Governor Peay, on March 20, sent to the Legislature an urgent message, and the only special message of the session, advocating the immediate repeal of the act. The House by a majority of seventy-four to thirteen had already voted to repeal, and the Governor's action was expected to coerce the Senate to similar action. This focused the entire fight on the Senate, where the bill was tabled by a vote of eighteen to eleven, thus practically killing the effort to repeal the measure.

Little sentiment was displayed for the repeal previous to the Governor's message, and at the hearing before the public utilities committee of the Senate few representatives of the cities appeared to urge favorable action.

The Mayor and the city attorneys of both Memphis and Chattanooga advocated repeal, while the officials of both Nashville and Knoxville, the two other larger cities, took an opposite view.

MAYORS ADVOCATED REPEAL

A committee for the city attorneys conducting a rate case against the Cumberland Telephone & Telegraph Company were unanimous in defending commission rule, and the bill to repeal was reported for rejection.

On the tabling of the measure, a new bill was offered by Senators A. B. Anderson and W. H. Washington, suggesting an amendment to the present law, increasing the personnel of the commission to five and adding a special lawyer to serve as counsel for cities and consumers wishing to protest against utilities. This passed the Senate, but in the press of the final days of the session it was not brought up for consideration by the House.

Several evasive bills were offered to take the larger cities from the commission's control, but these, too, met defeat.

Trial of Striking Employees July 10

Col. William J. Donovan, United States Attorney for the western district of New York, announces that a special session of the Federal court will be convened in Buffalo beginning July 10, with Judge John R. Hazel presiding. The special term was called to hear the trial of State Senator Robert C. Lacey and striking employees of the International Railway, Buffalo, charged with conspiracy in connection with the dynamiting of the Buffalo-Niagara Falls high-speed electric train last summer, in which many persons were injured. Two of the prisoners are also charged with perjury in connection with the case. The men will be defended by attorneys representing the Amalgamated Association.

$5,500,000 Electrification Project at Boston

It is estimated that it will cost the city of Boston $4,500,000 to carry out the provisions of the so-called Dorchester transit bill, the passage of which was referred to briefly in the ELECTRIC RAILWAY JOURNAL for June 9. This does not include expense for equipment totaling another $1,000,000.

The Dorchester transit bill is calculated to give the people of Dorchester rapid transit on Boston Elevated trains as far as Fields Corner, with surface car connections from that point as far as Welles Avenue, over what is at present the Shawmut branch of the New Haven road.

The bill provides that the city of Boston shall finance the entire project, paying the cost of extending the tunnel beyond Andrew Square, changing the railroad tracks on the Boston division and procuring this right-of-way for the Elevated; defraying the cost of land taking and damages and new track equipment, and purchasing the Shawmut branch outright from the New Haven and Old Colony roads at a price not to exceed $1,000,000. (The Interstate Commerce Commission has estimated the physical valuation of the Shawmut branch as $1,050,000).

The bill states that after the city has acquired the property it shall be leased to the Boston Elevated at a rental rate of 4½ per cent a year, "upon the fair and reasonable cost, as determined by the Public Utilities Department of the premises and equipment." But it is stipulated that, though the rental shall be not less than 4½ per cent, it shall in any event be one-half of 1 per cent more than the rate of interest the city has to pay on its bonds. The one-half of 1 per cent profit a year accruing to the city is intended to go into a sinking fund, which, in the end, it is anticipated, will amortize the principal. Mr. Ufford has estimated that the city can discharge the entire cost in 40 years.

The method of financing is the same followed in the acquisition of subways by the city and rental to the Elevated.

Apparently the only direct expense to be borne by the Elevated will be the purchase of new cars. At the company offices, it is estimated that 40 new tunnel cars will have to be provided at a probable expense of $20,000 each, totaling $800,000. As additional surface cars may have to be furnished for the run beyond Fields Corner, the total expense to the Elevated might reach $1,000,000.

The principal physical changes decreed in the bill are:

1—Extension of the Dorchester tunnel from its present terminus a few hundred feet beyond Andrew Square so that tunnel trains will come to the surface to the west of the tracks of the Boston division of the New Haven road. This is to bring the tracks under Boston and Power Street and Dorchester Avenue, thus avoiding grade crossings.

2—Use by the Elevated of the railroad right-of-way on the Boston division of the New Haven road from Dorchester Avenue to Harrison Square where the Shawmut branch begins. The railroad tracks are to be moved over toward Dorchester Bay, and the Elevated trains will run over the present location of the New Haven tracks. Shelters or stations for Elevated passengers must be provided at Columbia Road and Savin Hill Avenue and at such other points as may be agreed upon between the Elevated and the Public Utilities Department.

3—Erection of a terminal at Fields Corner, where the Dorchester tunnel trains will be looped or run dead in, for the return trip to Harvard Square.

4—Use by the Elevated of the Shawmut branch from Fields Corner to Welles Avenue or beyond to serve Milton for single car service connecting with the new rapid transit line.

Commission Rules on Deferred Maintenance and Property Appraisal

The Public Utilities Commission of the state of Tennessee recently handed down a decision involving three technical points in the application of the Nashville Railway & Light Company for increased rates.

The first question presented was whether the commission's order of Dec. 31, 1920, should be construed as allowing the company to compute the return on its property from April 1, 1920, or from Dec. 31, 1920. The commission said the latter date was the one intended.

The second question referred to the method of handling the expenditures for deferred maintenance under the order of Dec. 31, 1920. The commission ruled that the proper method was to credit the sum monthly, beginning April 1, 1920, with an amount equal to the excess of the actual expenditures of the company for maintenance during each month over and above an amount equal to 10 per cent of the operating revenue for each month. This sum is not to includes charges to maintenance accruals to renewals and replacement reserve, with monthly payments on the deferred maintenance account to be deducted from the earnings of the company under the rate of return prescribed by the previous order. This account must be wiped out by April 1, 1924, the commission held, regardless of the net earnings of the company over 6½ per cent.

The third question settled was whether the expense of the appraisal of the property of the company made in 1920 and the cost of the traffic survey completed in 1921 should be amortized over a period of years. The commission held that the cost should be spread out over a period sufficiently long to allow the company to pay it at the rate of $1,000 per month, beginning April 1, 1920, and the cost of the traffic survey at the rate of $500 per month, beginning Jan. 1, 1921.

Wages Under Discussion

A new wage agreement on the Berkshire Street Railway, Pittsfield, Mass., is under discussion, the yearly contract having expired June 1. The union has presented its case, but the terms desired have not as yet been made public. It is stated, however, that the request is for a substantial increase over the present scale.

Electric Service Restored Quickly After Philadelphia Fire

Fire which started under the track floor of the Broad Street station trainshed of the Pennsylvania Railroad at Philadelphia just before midnight on Sunday, June 10, wrecked the entire track floor and the huge trainshed and destroyed a large amount of baggage and railway property in the story below the track floor, including the power plant, which supplied heat and power to the station building. The terminal and office building lying east of the trainshed, was not injured. The size and rapid spread of the fire resulted from the antiquated construction of the station, built partly in 1881 and partly in 1893.



View Showing General Havoc Wrought by Flames

With the central point of the Pennsylvania System out of service through the fire, work to restore traffic was taken in hand immediately and with admirable energy. New signaling and dispatching wire lines were run outside the trainshed even while the fire was still in progress, the West Philadelphia and North Philadelphia stations were made terminal points, and crews started to repair overhead conductor wires at the west end of the station to permit electric traffic to be resumed at the earliest moment, using the platform extensions and sheds outside the main shed. By Tuesday morning, thirty hours after the outbreak of the fire, work was actively in progress building new platforms on the wrecked steelwork of the trainshed floor, and as the views herewith show, by the following morning several of these platforms were in service. Before this, stairs had been built for direct access from the street level to the surviving platform extensions west of the shed, and these went into service even on Monday.

At 11:45 p.m., June 10, when the fire was discovered, the entire station traffic of 529 trains daily was paralyzed. By 5 a.m., Monday, arrangements had been made for trains to terminate at North Philadelphia, West Philadelphia, Thirty-first and Chestnut Streets, and (for the Atlantic City trains) Camden, abandoning bridge train service from the coast. Conductor-wire reconstruction was so rapid that before four o'clock Monday afternoon electric service was resumed from the west end of the station shed to Paoli and Chestnut Hill, this service being made complete by midnight. By Thursday, June 14, normal steam-train service on two branches was resumed from Broad Street station, and bridge train service was resumed, terminating at West Philadelphia. Within seventy-two hours after the discovery of the fire, 246 trains, or nearly half the total, had been restored and nine of the sixteen tracks were available.

Pamphlet Will Inform Public

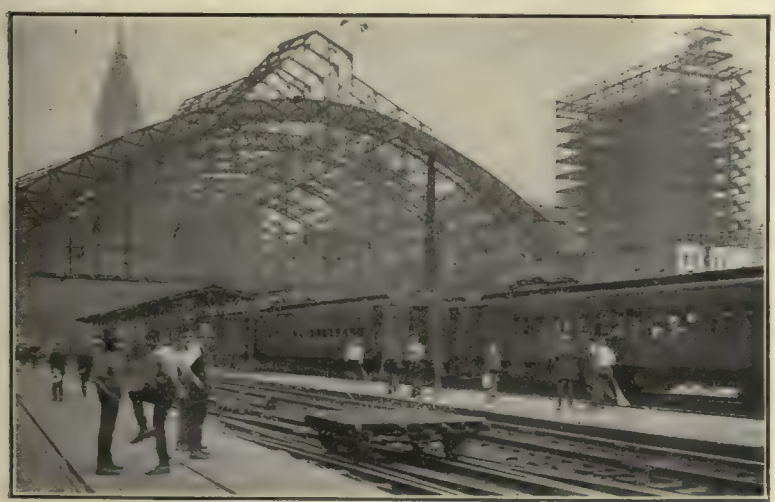
The Omaha & Council Bluffs Street Railway, Omaha, will keep its patrons informed through *Street Car Topics*, a small four-page publication which will be distributed twice a month. The first issue already has been circulated. Copies are placed in tin boxes which have been fastened within easy reach of passengers. In a foreword of the first issue the company states that the aim will be to place before those who ride in street cars facts bearing on various phases of street car operation and service. Further, the foreword says that to attain maximum service at minimum cost harmony and co-operation are necessary with a utility, its patrons, and the public officials charged with the duty of regulating the utility.

Service Being Improved in Schenectady

The Schenectady strike situation remains practically unchanged. The Schenectady Railway has extended its service to nearly all city lines and is now going ahead with the work of gradually building up a permanent force. While service is being maintained, there is little riding on the cars. Cars are being operated until midnight with no further disorders.

The interurban service is being maintained with a fair degree of patronage, the cars being manned by the old employees.

The State Industrial Commission adjourned its inquiry during the week ended June 23 subject to the call of the chairman. It is expected the members of the commission will render a report of their findings as to the cause of the strike in a week or ten days.



Electric Trains Being Dispatched from Point Outside of Train Shed



Crew of Tower Car Repairing Overhead Wires

Arbitration on Detroit Municipal Wages

The request of the employees of the Detroit Department of Street Railways for a 20 per cent wage increase and several changes in the existing working conditions will be arbitrated. The city will name an arbitrator, who will sit with Judge Edward J. Jefferies, the representative of the men, and they will appoint the third member of the board.

The present pay for platform men is $5 for an eight-hour day. The readjustment of schedules is to eliminate inequalities in runs and to bring the employees nearer to the average eight-hour day asked.

A somewhat similar action was taken by employees of the Detroit United Railway in asking for a 20 per cent increase in pay and the uniform readjustment of wages and working conditions on the Flint, Mount Clemens, Monroe and Ann Arbor divisions. At the first meeting between company officials and representatives of the employees methods were planned looking toward an agreement.

More Action on Dallas-Denton Interurban

The second attempt by legal action to prevent the laying of the line of the Dallas-Denton interurban on Fairmount Street in Dallas, Tex., has been begun by property owners on this street. In former litigation, recently decided by the State Supreme Court adversely to the property owners, an injunction was obtained in the District Court of Dallas County restraining the city from passing an ordinance giving the Texas Interurban Railway authority to lay its tracks on Fairmount Street. This was carried through the Appellate Courts to the Supreme Court, and there the court decided adversely to the property owners. Upon this decision the city passed the ordinance granting the Texas Interurban Railway the right to lay its tracks on Fairmount Street, and work was about to begin when the new action developed. The litigation is holding up the electrification of the Missouri-Kansas-Texas road from Dallas to Denton.

The Engineer in Public Affairs

Developing participation by engineers in public affairs was strongly evident at a meeting held in St. Paul, June 8-9, of the executive board of the American Engineering Council of the Federated American Engineering Societies. General round-table discussion revealed that local groups in many sections of the country are taking a constructive part in solving community problems. This local effort embraces traffic, smoke abatement, water supply, city planning, state and municipal legislation relating to engineering matters and related subjects. The committee on transportation is considering ways and means whereby the Federated American Engineering Societies may be of constructive service in relation to the transportation problem of the nation. The committee on storage of coal reported that its plans had been perfected and that the survey was well under way. Sub-committees are being formed in some eighty centers and each member society has been requested to designate a member on each sub-committee.

Mayor Will Approve Fare Ordinance in Seattle

Salary warrants of the railway employees of the Seattle Municipal Railway, which were due on June 11 and held up for two days, on account of the refusal of the Seattle banks to cash them, are to be paid by the transfer, as a loan, of $125,000 from the city light fund, provided for in an emergency ordinance which was passed by the City Council.

The increase in fare to the rate of 8½ cents three weeks earlier than expected will in all likelihood result in greatly aiding the Council in meeting the next railway pay warrants on June 25, and will also make easier the way for negotiations with the trustee of the railway bondholders for a modification of the purchase contract.

The immediate increase of the fare is also expected by city officials to influence the attitude of the bankers in future emergencies. Chairman Blaine of the finance committee states that the present difficulties of the railway and the fact that the system will be approximately $800,000 behind by Dec. 31 are largely due to the four months' experiment with the 5-cent fare.

Request of Minneapolis Men Refused

Horace Lowry, president of the Twin City Rapid Transit Company, Minneapolis, Minn., has refused the request of trainmen through their organization for a restoration of the wage schedule to 60 cents an hour from 53 cents, the rate which has prevailed since Jan. 1, 1922.

The employees based their request on increased cost of living, increase in pay by other railways, obligation of the company to maintain the 60-cent rate as long as the fare is 6 cents and the better financial condition of the company as evidenced by the recent declaration of a dividend at the rate of 6 per cent per annum as opposed to the 4 per cent rate which has been in effect for some time.

The company replied that living costs were greatly reduced from 1920 to 1922, but that the maximum rate of pay was continued to Jan. 1, 1922. The drop in living costs from 1920 was 19.5 per cent, while the pay reduction was only 11.6 per cent. Only ten of the fifty railways comparable to the Twin City Lines have increased wages. The company said that it had been necessary to cut common dividends for the last five years below a fair return on capital.

Provision of Kansas Law Fixing Wages Declared Unconstitutional

The Kansas Industrial Court Act has been held unconstitutional by the United States Supreme Court in so far as it permits fixing of wages.

The court held, in a suit brought by the Charles Wolf Packing Company, that the drastic regulation attempted by the Kansas act on the principle that certain industries are affected with the public interest, is clearly invalid under the Fourteenth Amendment to the Constitution.

Under this guise of "public interest" employers and labor have been required to submit differences to the Industrial Court for compulsory arbitration. Thus the court has fixed wages.

The state has also used the Industrial Court to keep prices of essentials—food, clothing and fuel, chiefly—at reasonable levels. The court's action was based chiefly on that section of the Kansas law which forbids workmen the right to strike.

Chief Justice Taft delivered the court's opinion, which was unanimous. Mr. Taft concluded:

> We think the Industrial Court act, in so far as it permits the fixing of wages, is in conflict with the Fourteenth Amendment and deprives the plaintiff of its property and liberty of contract without due process of law.

Arbitrary Deflation Would Be Unwise

It is the general consensus of opinion of the research committee of the National Monetary Association, as announced at its recent meeting, that the economic and monetary affairs of the world are in such a disturbed state that the formulation of any specific plan for stabilization at the present time is extremely difficult, especially in view of the wholly anomalous distribution of the world's monetary stock of gold.

There was general agreement that any arbitrary attempt toward deflation or a return to any fixed pre-war standard was at the present time unwise and likely to bring about far more disturbance of business and industrial conditions than could compensate for any possible gain.

Union to Erect Building in St. Louis

The local division of the Amalgamated Association for St. Louis, Mo., has purchased the entire frontage on the west side of Grand Boulevard between Bell Avenue and Windsor Place for a modern office building. The purchase price of the ground alone is said to have been $100,000.

The proposed building will contain stores on the ground floor with offices and meeting halls for various local unions in the upper stories. A feature will be a large auditorium. Unions now housed in other structures are expecting to seek quarters in the new building of the carmen.

News Notes

Wage Agreement Being Negotiated by Interborough.—Preliminary discussions have begun between officials of Interborough Rapid Transit Company, New York, and representatives of employees with a view to extending or modifying the existing wage agreement which expires June 30. Present wage schedules were accepted by the employees in July, 1921, to be effective for one year. The period of the agreement was extended in July, 1922, for twelve months to June 30, 1923.

Receives Policies as Gifts. — Three hundred employees of the Tri-City Railway, Rock Island, Ill., received as a gift from the company insurance policies in the Traveler's Life Insurance Company effective for the current year. They were in amounts corresponding to the length of service. To qualify for a policy one must have been in the employ of the company six months. The policies contain a disability clause ineffective after the policy holder reaches the age of sixty years. Those who have been employees of the company for ten years received policies in the sum of $1,500.

Wage Increase Sought.—The Cincinnati street car men's union has sent a formal notice to the Cincinnati Traction Company seeking an increase in wages for the 1,700 employees. The increase sought averages 17 cents an hour. The present pay of motormen and conductors is 43, 45 and 48 cents an hour. The present agreement expires on July 1. If no agreement is reached the matter will be settled by arbitration as provided for in the contract between the traction company and its employees.

Men Adopt Real Slogan.—"He who does only what he is paid for is paid for only what he does." This motto has been posted in the carhouse of the Springfield (Mo.) Traction Company. At various times the men adopt mottoes to be posted in the shops to encourage them to do their work. Usually the signs pertain to methods of "safety first." For the year 1923 the motto will be placed in conspicuous places in the carhouse and shops to remind the men of their true value to the company and their duty toward themselves.

Seeks Franchise Approval.—Application was filed with the Public Service Commission on June 8 by the New York State Railways asking for the approval of a franchise granted to the company by the city of Utica to operate an extension of its present street railroad lines along James Street in the city of Utica. The proposed extension will start from the present track on James Street and extend in an easterly direction to St. Vincent Street, connecting with a loop upon private property. A franchise was granted by the city on May 7, 1923.

Paving Obligation Will Be Argued.—Judge E. S. Morris has taken exception to the ruling of Judge N. B. Hunt, who recently passed judgment for the Henderson Traction Company to the effect that the company was not liable for street paving between the rails and 12 in. on each side of them and an immediate appeal was granted to the Court of Appeals. Judge Morris will go to Frankfort to hear and argue the case when the higher court sets a date for same. The City Commissioners are anxious to get a final hearing as early as possible so they will know how to proceed in awarding contracts for street paving this summer.

"All Aboard" Appears.—*All Aboard* is the clearing house through which all news of the various departments of the United Electric Railways, Providence, R. I., will pass. This monthly pamphlet made its debut on June 1 and will appear each month in the interests of the employees. In the first issue A. E. Potter, president and general manager, tells what he thinks a company publication should do and urges all to send in contributions and suggestions for betterment of service, etc. Six years ago the employees of this company had their own paper, which was known as *The Trollier*.

Discharge of Employee to Be Arbitrated.—The employees of the Middlesex & Boston Street Railway, Newtonville, Mass., will not strike because of the discharge of William Rowse, a motorman, whose car was in collision with another. Judge Pierce of the Supreme Court, after a lengthy hearing on June 15, denied a preliminary injunction asked for by the company, and said that he agreed with James H. Vahey, counsel for the union, that a disputable question was involved that should be settled by arbitration. Pitt F. Drew, who represented the railway, announced that he would abide by the decision of Judge Pierce, and that the company would arbitrate.

Home Rule Urged for Wisconsin.—Home rule or the local regulation of the rates and services of electric light and power, railway, gas, telephone and other public utility properties by the cities in which they operate instead of by the Railroad Commission was recommended in an address by Arthur A. Bentley, Mayor of LaCrosse and president of the League of Wisconsin Municipal Cities, at its twenty-fifth annual convention of that organization in this city. Mr. Bentley said that the control of utilities by the Railroad Commission was to a degree right in principle, but in actual practice many cities of the state have found that it sometimes works a grave injustice to the small taxpayer.

Transit Conferences Started. — Conferences between the New York Transit Commission and a committee named by the Board of Estimate have begun and will continue until the difficulties in the way of the construction of new subways have been removed or until it is evident that there is no hope of agreement between the two bodies. No conclusions were reached but the six men went over the maps and routes of the lines proposed by the Mayor and by the Transit Commission. Routes on which there is little disagreement include the Brooklyn crosstown and Washington Heights lines, and hope was expressed that an agreement might be reached to start construction.

Saving Power in Dallas. — The power-saving campaign conducted by the Dallas Railway continues and gratifying results are shown, according to Richard Meriwether, vice-president and general manager. C. J. Crampton, in charge of employment and safety, is authority for the declaration that one motorman became so enthusiastic over the power-saving drive that on a long coasting trip he called back to his conductor, "Pull down the trolley, Ed, and save the wheel." George I. Plummer, superintendent of traffic, told the men that, regarding the power-saving campaign, another source of power loss is stopping, or rather starting, in a curve. He advised trying to coast around all curves and make stops clear of same.

Grants Temporary Injunction.—Federal Judge John R. Hazel in Buffalo has issued a temporary injunction upon application of counsel for the International Railway restraining the Collector of Customs at Niagara Falls from forcing the traction company to suspend service over the upper steel arch bridge at Niagara Falls Sundays, holidays and between sundown and sunrise. The temporary restraining order is effective until June 25, when arguments will be heard by the court to make the injunction permanent. The reason advanced by the government is that the International has failed to obtain a special permit required under the 1922 tariff law. Such a permit would enable the company to unload passengers and merchandise at the American end of the two bridges at the prohibited hours.

Proposed Vote on Trolley Rehabilitation.—The new board of Aldermen of Goldsboro, N. C., in their first regular session, ordered an election to see whether the city should spend $35,000 to equip and put the Goldsboro Street Railway in operation. This is the second time within a year that the same resolution was passed, the old board several months ago ordering such an election, which was never called. The rehabiliation of the Goldsboro property has been referred to previously in the ELECTRIC RAILWAY JOURNAL. It was announced early in the year that the people would vote in about six weeks to decide whether the city would put the car system in operation again. At that time it was stated that the city had about $35,000, which was realized from the sale of the old power plant, and that the city was holding the money as a sort of trust fund. Later, it was said that the amount of money to be used for the rehabiliation of the property had been increased to $40,000.

Foreign News

One-Man Car Experiments in England

The working of an experimental one-man car on the London United Tramways for the past year has proved so successful that the tramway companies are engaged in the conversion of several ordinary cars to the one-man type. St. Helens Town Council is about to try a car of the same design. It is a single-deck car, seats thirty-four passengers and is divided into two compartments, one of which is for smokers.

Cost of Road Surface Maintenance

For many years tramway authorities in Great Britain have agitated against the injustice of the law, which is set forth in the tramways act of 1870, which imposes on them the work and the cost of maintaining the street paving between the rails and tracks. When the law was passed horse cars were of course the rule, so that there was a justification for the arrangement. But electric cars do not wear out the road surface at all, and since the advent of the auto tramway authorities are bearing the ever-increasing burden of repairing surfaces which are smashed up by heavy motor lories and buses.

The latest effort to obtain relief has also resulted in failure. The London County Council recently applied to the Ministry of Transport for a grant from the national road fund (which is derived from the taxes on automobiles) for road surface maintenance. The reply is that the Ministry has no power to give financial assistance from the road fund for such a purpose. It was of course never intended that the road fund should help tramway authorities; its disbursements go to general road maintenance. That, however, does not lessen the growing hardship from which the tramways are suffering.

London Underground Railway Improvements

While the work of construction for extensions and improvements on the London Underground Electric Railways is going on merrily, and while the bills in Parliament to authorize further extensions are having a smooth passage, detailed improvements are being put in hand almost from day to day. One of the latest announcements is that a contract has been placed with John Mowlent & Company for £67,784 for escalators at Tottenham Court Road station. There are now two separate stations at Tottenham Court Road, one for the Central London line on the street level and one for the Hampstead line which is below the road surface. The former station is to be abandoned (with the consequent loss of the existing lift facilities) and the Hampstead line booking hall made common for the passengers of both lines.

Considerable improvements will be made here by way of enlarging this common booking hall to accommodate the traffic which will result. The Hampstead line lifts will also be abandoned and will be superseded by escalators which will convey passengers direct to the platforms of both Central London and Hampstead line stations. Passimeters will be installed in place of the existing booking office. The scheme of reconstruction also provides for a stairway connection from the site of the existing Central London booking hall to the new improved booking hall and circulating area beneath the roadway.

The merging of these two stations into one and the provision of escalators will enable passengers to reach the platforms in a much shorter time than at present. The fact that the escalators will take passengers right to the platform levels will also be welcomed as it entirely eliminates the traversing of long corridors after leaving the lifts.

Subway and Tramway Purchases Approved

A Parliamentary Commission sitting in Glasgow on April 10 granted an order to the Glasgow Corporation conferring powers on the corporation to purchase the Paisley tramway undertaking and the Glasgow Subway undertaking. Both of these formerly belonged to and were worked by private companies. They will now be worked as parts of the Glasgow tramway system. As already announced, the corporation had come to agreements for the acquisition of both the Paisley tramways and the subway, but it was only recently that legislative sanction was obtained. There was one point of much more than local interest before the Parliamentary commission. This was in reference to the subway, which is an underground railway forming a circle and worked by cable haulage. The corporation proposes to electrify it. On behalf of the municipality it was stated that the Ministry of Transport maintained that the subway was a railway and that it ought to be dealt with as such by the corporation. The latter's reply was that it was merely an underground tramway, and the suggestion that it should be managed as a railway was viewed with apprehension by the corporation, having regard to the fact that a railway was subject to an elaborate code of regulations involving a great many obligations imposed appropriately on a railway but entirely out of place in the case of a small undertaking like the subway. For working the subway the corporation would use its own tramway staff, but if it was made a railway the enterprise would require a separate staff and the corporation would become to all intents and purposes a railway company. It was also pointed out that the tramways were part of the common good of Glasgow, and the proposal was that the subway should be purchased on the security of the common good. Unlike municipal tramways in other towns, there was no power to fall back on the local rates to make good deficiencies, and if the subway was treated as a separate unit it was not possible to see how to deal with either a deficit or a surplus. The commissioners decided that the subway should be taken over on the footing of a tramway and not as a railway. The commission also refused an application by the Ministry of Transport for power of control of tramway fares. Certain tramway extensions sought by the corporation were approved.

$5,000,000 for Escalators

It is estimated that the cost of providing escalators or moving stairs now arranged for at numerous London tube railway stations will amount to nearly £1,000,000. The escalators will take the place of lifts and have the double advantage of greater carrying capacity and the saving of passengers' time. Two new contracts for the installation of these contrivances relate one to Moongate Street Station, where the foundation company will put them in at a cost of £42,574, and the other to Shepherd's Bush Station, where Messrs. J. Cochrane & Sons will install the moving stairs at a cost of £21,709. Moongate Street is a dense city station, while Shepherd's Bush is suburban.

Ticket Selling Machine a Success

The London underground railway companies are so satisfied with the new automatic ticket-issuing machines at Victoria Station that they propose to introduce a similar arrangement at Waterloo Station. A device has been fitted which enables a warning bell to be rung in the station booking office when the stock of tickets in the machines is running low. All the machines are electrically operated and a clever arrangement permits of their refusing money if the machine is out of order or the stock of tickets is exhausted.

Central Office Under Construction

Rapid progress is being made with the construction of new central offices at St. James' Park Station for the London underground electric railway companies. The new offices, which have an area of about 45,000 sq.ft., are being constructed immediately over the tracks of the Metropolitan District Railway and are built upon massive girders weighing, altogether, 400 tons. There will be six stories and when complete the building will accommodate a staff of approximately 400. The work will be completed during 1923.

Financial and Corporate

St. Louis Company Does Better

United Railways Reports Surplus of $513,091 for 1922, Compared with $303,045 for 1921

Rolla Wells, receiver of the United Railways, St. Louis, Mo., reports net income of $513,091 for the year ended Dec. 31, 1922, as compared with $303,045 for the year 1921. The statement of earnings of the company is as follows:

UNITED RAILWAYS, ST. LOUIS
CONSOLIDATED INCOME AND EXPENSE STATEMENT FOR THE YEARS ENDED DEC. 31

	1922		1921
Operating Revenue			
Revenue from transportation:			
Passenger revenue	$19,701,598		
Special car revenue	29,694		
Express revenue	8,826		
		$19,740,118	$19,498,946
Revenue from other railway operations:			
Station and car privileges	$176,705		
Rent of equipment	1,908		
Rent of buildings and other property	16,334		
Sale of power	28,490	223,437	159,604
Gross operating revenue		$19,963,555	$19,658,551
Operating expense and charges			
Current operating expense:			
Way and structures	$1,268,788		
Equipment	1,505,824		
Power	2,099,256		
Transportation expense	6,535,401		
Traffic expense	23,630		
Injuries and damage reserve	1,197,813		
General and miscellaneous	764,796		
Depreciation reserve	1,500,000		
	$14,895,508		
Taxes	1,845,723		
Total operating expense, depreciation and taxes		16,741,231	16,768,915
Income from operation		$3,222,324	$2,889,635
Non-operating income			
Rents—Less: Taxes and expenses	$8,796		
Interest on deposits	13,540		
Interest from investments	180,282		
Miscellaneous	213	202,831	216,349
Gross Income		$3,425,155	$3,105,985
Other Deductions			
Interest on funded debt	$2,339,807		
Interest on receiver's certificates	294,000		
Interest on mill tax judgment	143,779		
Interest on notes payable	109		
Amortization of discount and expenses on receiver's certificates and extended funded debt	108,229		
Income tax on bond coupons	23,414		
Bank services—payment of bond coupons, etc.	2,725	2,912,063	2,802,939
Net income for the year		$513,092	$303,046

Mr. Wells, in his comments, has gone into the work of the company for the year at considerable length. A statement by him of the capital expenditures made during the year shows that the total additions amounted to $1,065,939. This sum was divided among the several grand divisions as follows: Way and structures, $366,779; equipment, $564,352; power, $134,804. Against this were total deductions of $107,104, as follows: Way and structures, $69,349; equipment, $107,104. This left the net additions for the year at $958,832.

The total mileage of the system (in single track) on Dec. 31, 1922, was 460.93. In 1922 the company reconstructed 23.54 miles. A table contained in the report shows that since 1904 the amount of track reconstructed, renewed or extended was 491.41 miles for the nineteen years, or more than the grand total of mileage of the company at present.

It is impossible here to do more than touch upon some of the high spots of the report. Among other improvements four automatic substations were installed during the year. Mr. Wells says that the year 1922 was one of great activity in the shops of the company. The number of passenger cars owned at the end of 1922 was 1,579, of which 1,400 were motor cars and 179 trailers. Fifty new cars of the so-called 777 type were completed during the year, making a total of 101 cars of this type completed and in service. In this connection it is interesting to note that ten of these cars were provided with independent air compressors, replacing the old storage air equipment. An analysis of the work order made in connection with the construction of these cars in the company's own shops showed that more than 1,100 different items of material were used in the manufacture of this type of car.

The receiver says that 665 cars were equipped with Economy meters. They were installed on all cars operating from the Park, Jefferson and Geyer and the De Baliviere and Neustead stations. He explains that it was expected that the installation would be completed early in 1923 on cars operating from all stations. In discussing the installation of the meters the receiver said:

> Total investment for installing meters and other necessary equipment was estimated at $105,800, operating cost of instruction and clerical force for first year $15,100, making a total expenditure for the first year of $120,900. Based on results already shown, and on average energy cost for years 1921 and 1922, annual gross saving in power cost would be $189,900, or a net saving of some $69,000 at end of first year of complete equipment. Besides the tangible saving in power, indications are that cars are being operated more safely and that greater care is taken on the equipment, which should make a further saving in maintenance of electrical equipment and in brake-shoe and wheel wear.

Reference is made by the receiver to the status of the valuation case before the Missouri Public Service Commission. He said in this connection that a tentative valuation would be handed down before mid-summer. As noted in the ELECTRIC RAILWAY JOURNAL for June 9, this has since been done. The valuation is of course tied in with the matter of rates. In discussing the rate adjustments the receiver said:

> On June 30, 1922, the Missouri Public Service Commission issued an order extending the present 7-cent fare to Aug. 1, 1922; on Aug. 24 a supplemental order was issued extending said fare to Dec. 31, 1922; on Dec. 26, 1922, an order was issued extending the 7-cent rate of fare until such time as the commission should issue its order in the valuation case.

The accompanying statement shows the principal traffic statistics of the company for the years 1922 and 1921.

	1922	1921
Revenue passengers	286,076,475	282,447,190
Transfer passengers	152,261,868	150,562,354
Total passengers	438,338,343	433,009,544
Percentage of revenue passengers using transfers	53.22	53.31
Average fare per passenger (including transfers)	4.49c	4.49c
Average fare per revenue passenger	6.89c	6.89c
Passenger car-miles	44,229,300	44,229,210
Revenue passengers per car-mile	6.47	6.39
Total passengers per car-mile	9.91	9.79

The necessity of analyzing work orders and accounts more in detail had been realized for some time, the receiver says, and in devising the new system, considerable thought was given to the problem of working out an accounting scheme that would not only take care of the stock records but would supply information for the general books and for detail analysis of work orders. Mr. Wells says that these ends have been accomplished, without duplication of work, by the aid of Powers accounting machines, consisting of a punch machine, sorter and printer tabulator. A card which contains all data required is punched for each charge and for each credit. These punched cards are sorted mechanically by catalog number, account number, work order number, etc., depending on the class of information desired, and are then run through the printer tabulator, which furnishes printed lists, with totals, which lists are used as a posting medium for general books and subsidiary records. Mr. Wells says that this

system, at a very reasonable expense, has enabled the company to insure accuracy in work order costs and to get much desirable information which would have been very expensive and difficult to obtain otherwise.

The burden of taxation which the company bears is strikingly illustrated in a detailed statement of the amount set up on this account during 1922. In addition to direct taxes of $1,808,692, the company expended $477,992 for street paving, and furnished free transportation for the police and the firemen of St. Louis. The total of taxes and street paving costs for the year 1922, was $2,355,061, or 0.823 cents per revenue passenger, as compared with 0.791 cents per revenue passenger in 1921.

During the year 1922 the average distribution of power on a kilowatt-hour basis was as follows:

	Per Cent
Purchased water power	55.9
Purchased steam power	27.4
United Railways' plants	16.7

The prolonged coal strike of 1922 made it necessary for the company to supplement the use of coal in the receiver's power plants with some other form of fuel. After careful investigation it was decided to install fuel-oil burning equipment, and ten boilers at the Central power station and ten boilers at the Northern power station were equipped with oil burners and the necessary auxiliary apparatus, such as storage tanks and pumps. For a period of thirty days the majority of the power supplied by the receiver's plants was generated by oil. The oil burning equipment is being held for future emergencies.

International Seeks to Establish $96,539,185 Value

Additional evidence was heard during the week ended June 16 by the Public Service Commission in the rate proceeding pending before the commission in an attempt on the part of the city to have the 5-cent fare re-established on the local lines of the International Railway, Buffalo. Three witnesses were sworn by Coleman J. Joyce, counsel for Mitten Management, Inc., which operates the local and interurban lines of the International. The company is seeking to establish its valuation at $96,539,185 for the entire system.

The witnesses included Charles Hansel, consulting engineer for the Pennsylvania and the Reading Railroads; William K. Myers, vice-president of finance of the Philadelphia (Pa.) Rapid Transit Company; George W. Fuller, consulting engineer of Summit, N. J., former member of the Pennsylvania Public Service Commission. These men constitute the valuation committee of the International. They estimated the cost of engineering and superintendence at $2,225,195; preliminary promotion costs prior to construction, $885,295; administration and legal expenses, $2,065,688; taxes during construction, $515,000; working capital, materials and supplies, $1,457,544.

Ford Gets $2,000,000 Detroit City Issue

Short-term notes for $2,000,000 have been issued by the Detroit City Comptroller to Henry Ford and Edsel B. Ford to finance extensions to the municipal railway and to finance city expenditures for equipment. The notes bear interest at 4 per cent and will provide funds until city tax money begins to come in on July 15.

According to a statement of Clarence E. Wilcox, Corporation Counsel, the legislative act increasing the bonding limit of the city of Detroit did not change conditions so far as the prospects go for financing the city with funds obtained in New York. The New York buyers are not disposed to purchase bonds unless the municipality issuing the bonds has a net bonded indebtedness well within a fixed percentage of the assessed valuation.

The Michigan Legislature has increased the bonding limit of the city of Detroit so as to enable the expenditure of $80,000,000 for subways. In view of the fact that Detroit is now close to the 7 per cent limit, any further large bond issues will probably be sold only to private capitalists.

Holders of Illinois Traction Preferred to Receive Extra 1 per Cent

The regular quarterly dividend of 1½ per cent, at the rate of 6 per cent per annum, will be paid on the preferred stock of the Illinois Traction Company on July 2. An additional amount sufficient to make the combined payment equivalent to 7 per cent per annum for the quarterly period ending July 1, 1923, will be paid to shareholders who exchange their Illinois Traction preferred stock for the preferred stock of the Illinois Power & Light Corporation.

Payment in adjustment of such amount will accompany the certificates of 7 per cent cumulative preferred stock of the Illinois Power & Light Corporation issued in exchange. The certificates will be dated July 2, 1923, or thereafter for exchanges subsequent thereto. It is contemplated that dividends on the 7 per cent cumulative preferred stock of the Illinois Power & Light Corporation will be declared regularly at the quarterly periods payable Oct. 1, Jan. 1, April 1 and July 1 of each year. This stock will have full voting power, a privilege which the holder of the Illinois Traction preferred did not enjoy.

The Illinois Power & Light Corporation has issued a thirty-two-page booklet descriptive of the company and illustrative of its properties.

Plan of Key System Transit Announced

The financial plan of the Key System Transit Company which will take the place of the present San Francisco-Oakland Terminal Railways, will be as follows: common stock, $3,300,000; 7 per cent preferred, $6,100,000; 7 per cent prior preferred, $8,350,000; Oakland Railway notes, $2,500,000; general and refunding 6 per cent mortgage bonds, $1,121,000; general and refunding 5 per cent mortgage bonds, $6,417,000; first mortgage bonds, $2,500,000; divisional 6 per cent bonds, $465,000.

The East Oakland Railway, a subsidiary of the Key System Transit Company, will issue $250,000 in bonds in exchange for underlying issues outstanding.

Conspectus of Indexes for June, 1923

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares* 1913 = 4.84	June 1923 **6.92**	May 1923 **6.88**	June 1922 **7.04**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	May 1923 **173**	Apr. 1923 **175**	May 1922 **166**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	June 1923 **210**	May 1923 **208**	June 1922 **211**	Sept. 1920 **232**	Apr. 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	May 31 1923 **6.98**	Apr 30 1923 **7.29**	May 31 1922 **5.25**	July 31 1920 **11.12**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	May 1923 **15.58**	Apr. 1923 **15.00**	May 1922 **13.08**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures Number	May 1923 **1,467**	Apr. 1923 **1,638**	May 1922 **1,775**	Jan. 1922 **2,722**	May 1922 **1,467**
Liabilities (millions)	**31.77**	**51.66**	**48.21**	**105.7**	**31.77**

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Eng. News-Record Construction costs 1913 = 100	June 1923 **220.7**	May 1923 **218.7**	June 1922 **185.6**	June 1920 **273.8**	Mar. 1922 **182.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	May 1923 **156**	Apr. 1923 **159**	May 1922 **143**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	June 1 1923 **13.38**	May 1 1923 **13.67**	June 1 1922 **11.90**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's — Wholesale Commodities 1913 = 120.9	June 1 1923 **191.4**	May 1 1923 **192.9**	June 1 1922 **176.8**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	May 1923 **143**	Apr. 1923 **143**	May 1922 **139**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	May 1923 **168.3**	Apr. 1923 **159.1**	May 1922 **154.9**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials.

Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Number of Passengers on Sacramento Lines Increase

The accompanying table from the annual report of the Pacific Gas & Electric Company for the year ended Dec. 31, 1922, shows the progress made by the Sacramento Street Railway in the matter of total passengers carried and gross revenue. It is stated that largely as a result of the installation of a number of one-man cars the company was enabled to conduct its railway operations without loss of efficiency upon a somewhat more profitable basis than for some years past.

COMPARATIVE STATISTICS OF SACRAMENTO STREET RAILWAY FOR LAST DECADE

Year	Miles of Street Railway Track	Cars Owned	Total Passengers Carried	Car-Mileage	Car-Hours	Average Passengers per Day	Gross Revenue
1912	40.0	62	11,926,098	2,301,342	276,438	32,674	$547,187
1913	42.0	60	12,508,744	2,469,745	301,930	34,270	572,913
1914	42.9	60	12,256,142	2,481,968	303,263	33,578	556,908
1915	43.1	66	9,485,490	2,684,508	294,739	25,988	425,338
1916	43.9	66	10,044,428	2,919,041	299,873	27,519	442,303
1917	43.9	66	10,616,953	3,069,408	313,040	29,088	491,021
1918	43.9	70	11,331,864	3,067,599	312,439	31,046	534,068
1919	43.9	70	14,079,372	3,228,306	331,704	38,574	671,105
1920	44.1	76	15,770,295	3,210,112	332,895	43,206	753,028
1921	44.2	76	16,021,805	3,380,119	349,840	43,895	779,639
1922	44.1	76	16,075,231	3,171,580	329,737	44,042	799,192

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Fight Against Remaining in Receivership Lost.—The Eighth Avenue Railroad and the Ninth Avenue Railroad, New York, have lost their fight before the United States Supreme Court against remaining in the hands of Job E. Hedges, receiver of the New York Railways, by decision of the highest court.

Dividends Declared. — The Duluth-Superior Traction Company has declared two dividends of 1 per cent each on the 4 per cent cumulative preferred stock for the quarters ending March 31, 1923, and June 30, 1923, both payable July 2 to holders of record on June 15. In April of this year two dividends of 1 per cent each were paid.

Common Stock Dividend Increased.—The Eastern Texas Electric Company, Beaumont, Tex., has declared a quarterly dividend of $2.25 a share on the common stock and the regular semi-annual dividend of $3 a share on the preferred, both payable July 2 to holders of record June 20. Previously $2 a share quarterly was distributed on the common stock.

Service to Grove City Stopped.—Service on the Orient-Grove City branch line of the Indiana, Columbus & Eastern Traction Company stopped at midnight on June 16 in accordance with orders of the Federal District Court and the Ohio Public Utilities Commission. Application to halt service was due to loss in revenue attributed by the company to "unregulated bus competition."

Property Sold for $135,000.—The Slate Belt Transit Company's property, operating at Nazareth, Bangor and Allentown, Pa., has been sold at receiver's sale to Joseph T. Hambleton, representing the reorganization group. The purchase price was $135,000 for the right, title and interest of the company's franchise, etc. Cars and second and third mortgage bonds were sold in various groups for from 25 cents to $1 each.

Change in Name Made.—Shareholders of the Public Service Corporation of Quebec, a subsidiary of Shawinigan Power, have ratified by-laws providing for changing the name to the Quebec Power Company and increasing the capital from $3,000,000 to $10,000,000. Of this $4,000,000 will be preferred. This company is expected to absorb the Quebec Railway, Light, Heat & Power Company which it now controls.

Loss of $1,232 for Three Months.—The United Traction Company, Albany, N. Y., for the first quarter of 1923, reports railway operating revenues amounting to $905,674 and operating expenses $738,240. From the gross income of $180,540 there were total deductions, including rent for leased roads, interest on funded debt, other deductions, etc., of $181,773. This leaves the company with a net corporate loss for the period ended March 31 of $1,232. The corporate deficit at the end of the period amounts to $3,419,475.

Ratified Stock Increase Proposal.—The stockholders of the Louisville Railway have ratified a proposal to increase the authorized capital stock from $20,000,000 to $35,000,000. Amended articles of incorporation to this effect were filed by the company on June 1. The increase in the authorized stock is to make it possible for the company to hold stock of affiliated transportation companies, including its new $200,000 bus division. It may also hold some stock in certain rail or water transportation companies from which it receives freight tonnage.

Bridge Line Passes Dividend.—The stockholders of the Manhattan Bridge Three-Cent Line, Brooklyn, N. Y., have been informed by letter that the dividend payment due at this time will not be paid. There is $450,000 common stock outsanding on which 5 per cent annually has been paid since 1919. The passing of the dividend was decided upon as a measure for conserving the cash position of the company until such time as disposition has been made of the claims likely to arise out of the accident on the line on May 1, referred to in the ELECTRIC RAILWAY JOURNAL for June 9, page 978.

Stockholders Authorize Exchange.—The stockholders of the Broadway & Seventh Avenue Railroad, New York, N. Y., have voted to issue 11,000 shares of no par common to take the place of the present common stock. It is proposed to exchange the new stock for old $100 par common on the basis of one share of new no par common for each share of outstanding common, and provision was made to exchange the outstanding $100 par preferred stock for new common on the basis of one and three-quarter shares of new common for each share of preferred stock outstanding. The directors have likewise been empowered to issue two shares of the new no par common for each $100 face value of the notes of the company outstanding.

Preferred Stock Offered. — Spencer Trask & Company are offering at 93½ and accrued dividend to yield about 7.50 per cent, $1,500,000 of Consolidated Power & Light Company's 7 per cent cumulative preferred stock. The Consolidated Power & Light Company directly and through its subsidiaries owns and operates without competition, the entire electric power and light and electric railway business in Huntington, W. Va., Roanoke and Lynchburg, Va., and surrounding communities, as well as the gas business in Ironton, Ohio, Ashland and Catlettsburg, Ky., and the intermediate territory. The proceeds of this issue are to be used in part to provide funds for the purchase and installation of a new 20,000-hp. unit at the Kenova generating station necessary to meet the demands for electric power and service from the manufacturing industries in and about Huntington.

Shareholders at Montreal Reported Restive.—Pointed suggestions to shareholders of Montreal Tramways & Power Company are being distributed anonymously in Montreal and are believed to be a step toward breaking the long endured silence as to the exact position of the company. This has been a sealed book to the public for years. The circular is an open letter to the president and directors giving notice that an extraordinary general meeting of the company should be called. The letter in outlining the objects to be considered, deals with the points that everyone would like answered, profit and loss account, balance sheet, also appointment of a shareholders committee to inquire into the affairs of the company. According to the *Financial Post* the fight is against E. A. Robert, president, whose genius conceived the arrangement under which control of fares and earnings rests with a commission under the city while management remains with the private ownership. No one is disposed, says the *Post*, to deny Mr. Robert credit for this work, but he is considered as rather apt to disregard the rights of minority stockholders. Stockholders of the Montreal Tramways & Power Company have felt that he has failed to treat them properly during the past few years. He has given them no information that would enable them to judge of the value of their holdings.

Traffic and Transportation

Stops a Problem

Detroit Department of Street Railways Concerned Over Growing Menace of Accidents

A construction program and stop plan have been suggested by Ross Schram, assistant general manager of the Detroit Department of Street Railways, to reduce traffic accidents and speed up automobile and railway traffic. The plan includes the construction of 500 traffic safety zones annually with loading points for street cars three blocks apart instead of one and two blocks apart as at present.

Most drivers are content to average 20 m.p.h., which is a reasonably safe rate, but as traffic is constantly held up the tendency is to speed to make time. The license bureau for three months has been issuing drivers' licenses at the rate of more than 300 a day. Therefore, if steps are not taken to assure a fair average speed for vehicles, accidents would appear bound to grow in number. The stopping of street cars does more to prevent a sustained average speed for motor vehicles than any one other factor.

Skip Stop Plan Desirable

The D. S. R. is prepared to adopt at once a three-block stop plan on its entire system; that is, it will make stops spaced at an interval of three average length blocks. In addition to this the department would be willing, in its own interest and that of the public, to co-operate with the Department of Public Works to the extent of financing and building not less than 500 safety zones each year.

It is the plan that these safety zones will not be of the raised concrete type, but rather on the order of the post and chain type now being tried at Woodward Avenue and Kitherell Street. Plans for an improved type of zone of this kind have been made.

It is stated by Mr. Schram that the proposed stop plan would reduce the running time on the railway lines from two to five minutes and add only one-half block to the distance to be walked by pedestrians to reach a car stop. Moreover, adoption of the new plan would result in a saving of approximately $100,000 a year in the cost of operating the street cars.

Six-Cent Fare in East Cleveland

East Cleveland, a suburb of Cleveland, with a population of 30,000, ceased to have a 5-cent fare on June 19, although Cleveland riders continue to pay only a nickel. For the next five years East Cleveland car riders will pay a cash fare of 6 cents. Tickets will, however, be sold at the rate of nine for 50 cents, with a penny charge for a transfer ticket without any rebate.

Unlike Cleveland, East Cleveland does not have a service-at-cost franchise arrangement with the Cleveland Railway. Instead it operates on a five-year price agreement with an ordinance that specifies minimum service and calls for arbitration in the event that the city and company cannot agree upon an equitable fare rate for a five-year period. Almost a year ago the Cleveland Railway insisted upon a 6-cent fare for East Cleveland riders and a board of arbitration granted this rate, to become effective on June 19, the day of the expiration of the first five-year franchise period.

Litigation Ends in Salt Lake City Over One-Man Cars

The operation of one-man cars in Salt Lake City by the Utah Light & Traction Company has become a reality. The company's employees have withdrawn their objections to them, and the city ordinance prohibiting the use of such cars has been repealed. Beginning June 3 one-man cars were placed in operation on six of the company's routes, and additional ones will be operated in the near future. Ultimately, it is stated, about 50 per cent of the cars in operation will be converted to the new system. An increase in wages of 5 cents an hour has been granted by the company to the operators of these cars. The service on the lines on which they are operated will be increased from 33 to 50 per cent.

For some time past the Utah Light & Traction Company has had several of these cars in operation. However, each car has been in charge of two men, pending the outcome of an action brought by Salt Lake City against the traction company to test the validity of the city ordinance requiring each car to be operated by two men. This action has now been dismissed and the ordinance repealed. The case started last November with the arrest of one of the company's employees for operating a car with only one man. Complaint was filed in the City Court, the company was found guilty and fined $25 by stipulation of both parties. The company appealed the case to the Third District Court in order to test the jurisdiction of the city in this case. The demurrer of the company set forth that there was no public offense and that the court had no jurisdiction, but only the Public Utilities Commission had power to rule in this case.

The repeal of the ordinance was by unanimous vote of the city commissioners, all opposition to the one-man cars having been withdrawn on the part of the company's employees, and those of the public who opposed them having failed to continue their objections.

Shriners Ride Electric Way

Pass and Solicitation Under Busmen's Noses Got 90 per Cent of Shriners' Rides for Electric Railway

Like hawks espying their prey from afar, a group of New York "rubberneck" busmen descended upon the Shriners' convention at Washington in the week of June 4 fully resolved to snatch all possible business away from the Washington-Virginia Railway, in whose territory many of the gatherings were held. So confident were they that they came down with some twenty to thirty vehicles and posted barkers at the entrance to Shrine Park to din the delegates with the news that they could ride into Washington for 50 cents and get a return trip to their Pullman car hotels for $1.

Had the innocent Shriners known that the busmen had no authorized or definite stands in Washington, the invaders would have carried practically no traffic at any time. At first, they did have a little success because they stationed themselves at the park entrance, which was just out of sight of the Washington-Virginia tracks. Their triumph proved of short and profitless duration. A couple of leather-tongued railway men supplied with batches of weekly passes soon drove them from the field. When these electric ride salesmen began to explain that unlimited, transferable riding could be obtained between Alexandria and Washington for $1.60 a week the message got under the fez at once, with the result that some 1,500 passes were sold.

Passes a Sales Leader

Nor is that all of the story. The passes really served as a sales leader because the dashing tactics of the railway management got everybody to talking about the electric railway service and its general superiority. Thus the 1,500 passholders proved to be a nucleus around which gathered a much larger sale of cash fares at 24 cents and round-trip fares at 40 cents. In fact, the company estimates that it got 90 per cent of the business.

As for the invaders, by the second day the leader of the busmen had become so obnoxious in his desperate effort to get business that he was disposed of by the simple method of having him arrested as a public nuisance. From that time on his cohorts retreated from the field to pick up a little sightseeing travel before scuttling back to Harlem.

Discuss Railway Discontinuance

The Colorado Utilties Commission and the Trinidad Electric, Transmission, Railway & Gas Company are discussing the question as to whether or not the company may discontinue its electrically propelled street cars. The company is not running its street cars, and motor buses are taking care of the traffic. The company maintains that it has been unable to make receipts meet operating expenses for several years and that last year it lost $24,000.

Passenger Service Details Under Public Relations Head

All matters pertaining to passenger service, including sale of tickets, has been taken over by the department of public relations of the Indiana, Columbus & Eastern Traction Company, according to an announcement from headquarters in Springfield, Ohio. This change will permit W. S. Whitney, former general passenger and freight agent, to devote his entire attention to the freight business of the company. Ticket sales, advertising and publicity will be handled directly henceforth by the public relations department. A statement says:

> The department of public relations will, through publicity, seek to better our relations with the traveling and shipping public; through advertising create a demand for passenger service, and through the sale of tickets, close the contract. From then on it will be up to the transportation department "to deliver the goods."

Under this co-ordinated plan, officials pointed out, the department can direct its publicity and advertising to fit in with the sale of tickets, so that a campaign may be conducted more efficiently than if the separate departments handled the work as heretofore. Arthur V. Bland is in charge of the department.

Fewer Car Riders in Buffalo

Jitney competition in Buffalo is responsible for a big falling off in passenger revenues on the local lines of the International Railway for the first quarter of 1923. Figures filed by the company with the Public Service Commission show passenger revenues and car riders for the three months ended March 31 as follows:

Quarter Ended	Passenger Revenues	Passenger Fares
March 31, 1920	$2,339,079	43,768,267
March 31, 1921	2,575,664	40,057,144
March 31, 1922	2,505,683	38,536,723
March 31, 1923	2,111,520	32,324,064

The claim is made by the municipal authorities in the rate proceeding pending before Commissioner Pooley of the Public Service Commission that unpopularity of the management of the International, growing out of the strike last July, is responsible for the falling off in the number of car riders and passenger revenue.

Extra Charge if You Ride Late.—The Indianapolis Street Railway, after June 30 next, will charge a fare of 10 cents a passenger for its owl cars. The commission granted the company an increase of 5 cents on its plea that the old rate was unprofitable.

Prohibits Jitney Soliciting.—The City Council of Columbia, S. C., recently passed an ordinance prohibiting jitneys from running through the principal business streets soliciting passengers. The fare on the jitneys is 10 cents and on the cars of the Columbia Railway, Gas & Electric Company 7 cents.

Seven-Cent Fare Likely.—Des Moines is to have a 7-cent fare by July 1 if the stabilizing account is increased by $20,000. The sum of $22,270 was added during April, it was announced. The fund now is in excess of $130,000 and the franchise granted the company calls for $150,000. When that sum is reached the company must reduce the fare from 8 to 7 cents per passenger.

Will Seek Six-Cent Fare Continuation—The Dallas Railway, Dallas, Tex., does not expect nor want the 5-cent fare restored in Dallas when the one-year extension of the 6-cent fare privilege expires on June 27. The company has already notified the City Commission that it will ask for a continuance of the 6-cent fare after June 27, and it is expected that the grant will be made by the city for another year. In return for the grant of increased fares for another year, the company will be asked by the city to make improvements and betterments in its service.

One-Man Cars Operate.—Six one-man cars are now in operation on the lines of the Columbia Railway, Gas & Electric Company, Columbia, S. C. Two-man cars are also being operated. The new cars are light and are equipped with various safety devices; they are being well patronized and are easy riding and do not make so much noise as the larger and heavier vehicles. Before putting them in operation the company published in the local daily papers large advertisements calling on the public to patronize the street cars and "bank the difference."

Will Try Pass Plan.—The Sacramento Northern Railroad was granted authority on June 9 by the State Railroad Commission to adopt the weekly unlimited pass system of fares. The plan already is in effect in several southern California communities. The Sacramento Northern Railway will apply the plan in Sacramento, Chico, Vecino, Barber, Chapmantown, Mulberry, Marysville, Yuba City and between Marysville and Yuba City, where it operates local car lines. It will not be effective on the Sacramento-Swanston line. The plan, it is specified, is experimental and is to be tried during the period beginning immediately and ending Nov. 25.

Wants Seven Cents.—E. W. Oliver, general superintendent of the Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont., has sent an ultimatum to the town of Merriton declaring that he will recommend to the executive of the federal-owned road the surrendering of the existing franchise unless the company is granted a 7-cent fare on the local line and is guaranteed protection against buses and jitneys. The franchise in question will not expire for six years. Mr. Oliver protests that the franchise is burdensome, imposing very stringent conditions as to fares and paving. He proposes a new franchise for the railway company under which rehabilitation is promised, the company to pay for everything in excess of what it would cost the town if the tracks were not there.

Allows Fare Increase.—The application of the Fishkill Electric Railway to increase its fare was granted by the Public Service Commission on May 28. The old rate of fare had been 6 cents in the city of Beacon and extending to a zone limit in the hamlet of Glenham, with two 5-cent zones extending from there to Fishkill Village. The through rate for these two zones was 8 cents. The new rate combines these last two zones into a single 7-cent zone and changes the rate in the city of Beacon to the zone limit in Glenham to a 7-cent fare. There was no public opposition to these changes. The Public Service Commission, however, made a careful study of the conditions before granting approval.

Subject to City Regulation.—The Texas Legislature has passed a bill known as Senate Bill No. 45, which has for its purpose the regulation of motor trucks and jitney lines operating for hire on public roads and authorized streets. Suburban and interurban railways to operate motor trucks or jitney lines for transportation of passengers in incorporated cities and towns are subject to regulation by said cities and towns and within 5 miles thereof under regulation by commissioners' courts of the county. The law amounts practically to an extension within a 5-mile zone adjacent to municipalities of franchise rights held by transportation companies within said cities and towns.

Securing Names for Petition.—Jitney owners and operators are securing names to a petition asking for a referendum vote on the agreement, in the nature of a city ordinance, with the Birmingham Railway, Light & Power Company which goes into effect on July 1, and which puts the jitneys off Birmingham's downtown streets. Heads of the jitney men's organization claim they have 6,000 names signed to the petition, and that they will get the required number. Under the law 15,000 names of legal voters must be signed to the petition before a referendum vote can be called. As the agreement, or ordinance, goes into effect July 1, city officials are of the opinion the jitney men will not be able to secure the required number of names in time to call the election.

One Stop in Safety Zone.—On the recommendation of Captain James McDowell of the Police Traffic Department, each car of the Los Angeles Railway will make only one stop for loading and unloading passengers in the safety zone. When a car is standing at the front of the safety zone, waiting for the traffic signal to proceed, and two following cars stop behind in second and third position, they will load and unload passengers. The second and third position cars will cross the intersection without a second stop. This is considered an important step in speeding up service in the downtown district. This group movement of street cars at downtown intersections became effective on June 12. The plan under which it is being operated was described in a recent publication of the railway.

Legal Notes

FEDERAL COURTS—*Ordinance Held Not to Fix Maximum Fares Beyond Power to Change.*

An ordinance granting a street car franchise was passed in 1919 and fixed the fare for the first twelve months at 6 cents. It was provided, however, that at the end of that and each succeeding twelve months period the company should submit a statement of its receipts and expenditures and should return to the city any excess over expenses and a reasonable return on the investment. The fare should then be reduced to only that necessary to provide a reasonable return, and that the valuation of the company's property may be appraised in a manner prescribed in the franchise. It was held that this franchise does not show a contract binding on the company to accept the rate of fare prescribed for the first year as a maximum fare for the life of the franchise, that the company retained its right after the first year to a reasonable return on the value of its property used in the public service and that it was not prevented from attacking an ordinance fixing the same fare for subsequent years. [City of Paducah, et al., vs. Paducah Railway, 43 Sup. Ct. Rep., 335.]

CALIFORNIA—*Doctrine of "Last Clear Chance" Defined. Duty at Stops.*

To make a defendant liable, under the last clear chance doctrine, it must appear that the defendant was not only aware of the danger in time to have avoided the injury, but must have known that the plaintiff was oblivious of his danger and unable to avoid it, and further that the defendant failed to exercise ordinary care to avoid the injury.

An instruction that it was the duty of the motorman and conductor to make sure, by looking to see, that plaintiff had alighted from the steps of the car, and if the jury found that either or both of them neglected to perform such duty, and in consequence plaintiff was injured, etc., verdict should be for plaintiff, was not erroneous, as assuming that the car had come to a stop and was again started before plaintiff had alighted, especially where other instructions clearly submitted such issue to the jury. [Gainer vs. United Railroads of San Francisco, 208 Pacific Rep. 1013.]

GEORGIA—*What Are Tracks?*

"The word 'tracks' means the space included between the outside edges of the outside rails of each line," according to the Supreme Court of Georgia, "and is not dependent upon the length of the cross ties." This case came up in a paving suit brought by an abutting property owner against the City Council of Augusta. [Rowland vs. City Council of City of Augusta, 113 Southeastern Rep., 2.]

INDIANA—*Contract Requiring Company Constructing Crossing Over Railroad to Pay Expenses of Repairs Held Void.*

A contract between a railroad company and a traction company, whereby the railroad company granted permission to cross its tracks at a street intersection in consideration of the traction company's agreement to pay all expenses incurred by the railroad company in repairing and renewing the crossing after its construction by the traction company, held void as against public policy and without consideration, since the traction company had the right to cross the railroad, and it was the absolute duty of each company to keep its own track in repair. [Terre Haute, I. & E. Traction Co. vs. Ross, 138 Northeast. Rep. 90.]

IOWA—*Street Railway Not Obliged to Maintain Safe Landing Place.*

The duty which the law imposes upon an ordinary railroad to provide and maintain a safe place for landing its passengers has no application to a street railway, its duty in such case being limited to the selection of a reasonably safe place for passengers to alight. The relation of passenger and carrier terminates the moment the passenger descends from the street car to the street. [Morris vs. Omaha & C. B. St. Ry., 187 Southwest. Rep., 510.]

MINNESOTA — *Mandamus Requiring Street Railway Company to Permit Examination of Books Cannot Be Avoided on Grounds Specified—City Can Also Examine Books of Holding Company.*

After the entry of judgment for the issuance of a writ of mandamus requiring a street railway company to permit the representatives of a city to inspect the books and papers of the company in connection with a valuation and the establishment of rates of fare, compliance with the command of the writ cannot be avoided on any of the following grounds: (1) That application for the inspection should have been made to the Commission instead of to the court; (2) that such an application had been made to and denied by the Commission; (3) that the proposed inspection was not relevant to the inquiry before the Commission; (4) that the city had an adequate remedy in the ordinary course of law; or (5) that the judgment and writ went beyond the findings. The city representatives should also be permitted to inspect the stock books of the holding company, as facts tending to throw light on the ultimate questions to be determined by the Commission are relevant. [State vs. Minneapolis Street Railway, 191 Northwest. Rep. 1004.]

MISSOURI—*In Collision Between Car and Delivery Wagon, Railway Held Liable for Injury to Helper on Wagon, Though Driver Was Negligent.*

In this case the driver of the delivery wagon and his helper were seated on the front seat when the delivery wagon was crossing the track, and the helper (the plaintiff) warned the driver of danger but was assured that everything was all right. Negligence was charged against both the chauffeur and the motorman, but the court held that the plaintiff had fulfilled his duty by warning the chauffeur. The owner of the delivery wagon, a bakery concern, was held not liable because the driver and the helper were fellow servants. [Rowe vs. United Railways of St. Louis, 247 Southwest Rep. 443.]

NEW YORK—*City Cannot Provide for Establishment and Operation of Bus Lines on Established Routes, Except in Compliance with Statute.*

Where there was no lack of adequate transportation facilities on a bus line as established, except for a short distance, and there was no demand or necessity for a line, and no possibility of maintaining one, there was no emergency; but, even if there was an emergency, the city of New York was not authorized to provide for the installation and operation of buses on established routes by private individuals, without compliance with the law relative to grants of franchises, consents of property owners, etc. [Kingsbridge Railway vs. City of New York, 198 New York Sup. 135.]

NEW YORK—*Franchise with Privilege of "Renewal" on Revaluation Held to Give Absolute Right to Renew.*

Where a franchise to a street railway company was granted for ten years, with a privilege of renewal for an additional period of fifteen years on a fair revaluation of the franchise, the original grant gave an absolute right to the additional period, and proceedings for the determination of the revaluation for the additional period were not governed by Greater New York Charter, Secs. 72, 73, 74, as section 74, providing that this act applies to renewals or extensions, refers to renewals or extensions beyond the terms of the original grant.

Where such a contract provided for the appointment of appraisers, and stated that, if the annual rate was not fixed within the specified time, the company shall pay the old rate until the new rate is determined, that company could prevent, by appropriate proceeding, the city from unduly delaying the appointment of the city's appraiser. [Manhattan Bridge Three-Cent Line vs. City of New York, 198 New York Sup. 49.]

Personal Items

Messrs. Dahl and Menden Head Brooklyn Company

Financier and Lawyer Heads Executive Committee of Successor to B. R. T. as Chairman—Engineer Long with Road Has Been Made President in Charge of Operation

Gerhard M. Dahl, a leading figure in the reorganization of the Brooklyn Rapid Transit Company, was elected on June 14 chairman of the executive committee of the board of directors of the successor company, the Brooklyn-Manhattan Transit Corporation. At the same time William S. Menden, who had been general manager for Receiver Lindley M. Garrison, was elected president of the company. Mr. Dahl, because of his position, will be the executive head of the system, but Mr. Menden will deal with all the problems of operation. He will consult with Mr. Dahl on the larger questions of policy, and everything affecting the company that is to come up to Mr. Dahl will do so through Mr. Menden.



G. M. Dahl

It is Mr. Dahl's desire to operate the system in a way that the public will be satisfied or as nearly satisfied as is humanly possible. This is a mighty big job and Mr. Dahl realizes it. He also knows that no system in the world can handle the peak loads of rush-hour crowds comfortably. As a point of contact for carrying out his program of keeping in touch with the public Mr. Dahl will have the advice and help of the three representatives of the public elected to the board of directors under the plan for the reorganization of the company as approved by the New York Transit Commission. So far as the attitude of the company toward the city is concerned, Mr. Dahl has said publicly that he assumes the city officials will endeavor to co-operate with the officers of the company.

This in short summarizes the attitude of the new head of the company to the problem of public relations. It is a statement of policy, but it represents the personal attitude of the head of the system toward matters of this kind in every instance in which he has had to do heretofore. In it is bound up the creed which attracted attention to Mr. Dahl in his post some years back as railway commissioner of Cleveland, when affairs there under the service-at-cost plan were largely in the making, and again brought him to public attention in connection with the handling of the affairs of the New Orleans Railway & Light Company. He it was who went to New Orleans, secured the co-operation of local banking interests and then set about the work of rehabilitation which culminated in the successful reorganization of the company as the New Orleans Public Service, Inc.

To say Mr. Dahl did the lion's share of the work in connection with the New Orleans reorganization does not mean much to those unfamiliar with that situation unless something is said about the extent of the chaos out of which the company there was lifted. At one time in the affairs of the New Orleans Railway & Light Company it appeared that the property had fallen heir to all of the ills that could possibly come to any utility. The public was disgruntled with the company, the city officials were at loggerheads with the management, the employees were restive and self-assertive, and the physical property was nothing if not at low ebb. Out of this tangle Mr. Dahl and those associated with him in arranging the reorganization were able to save something for the security holders and to put through an arrangement for operation in the future that would seem to preclude any possibility of the company ever again falling into disrepute.

In the handling of this work and also in the work which he has done in connection with the reorganization of the Brooklyn Rapid Transit Company Mr. Dahl has been able to bring to the problems confronting him long experience in the law and in the handling of public utility problems as operator, banker, and public official. He was born on June 8, 1876, at Fort Howard, Wis. He was educated in the public schools at Stoughton, Wis., and at the University of Wisconsin and was graduated with the degree of LL.B. in 1896. After being out of college one year he returned to the university in the fall of 1897 and took elective work until the spring of 1899. He then practiced law at Waupaca, Wis., from August, 1898, to September, 1901. He was city attorney of Waupaca later and then practiced law at Stevens Point, Wis., from September, 1901, to November, 1906. He was also district attorney of Portage County, Wis., from 1902 to 1906.

In the latter year he moved to Cleveland, Ohio, where he practiced law from Nov. 1, 1906, until January, 1910, when he was appointed street railway commissioner to represent the city of Cleveland. He continued to act in this capacity until Jan. 1, 1912, when he moved to New York to become vice-president of the Electric Bond & Share Company, which position he resigned on Jan. 1, 1917, to become vice-president of the Chase National Bank. He continued with the Chase National Bank until Jan. 1 of the present year, when he entered the investment and banking house of Hayden, Stone & Company.



W. S. Menden

Aside from the positions which Mr. Dahl holds with the Brooklyn-Manhattan Transit Corporation and the New Orleans Public Service, Inc., he is a director of the Alabama Power Company, the Alabama Traction, Light & Power Company, the Chase National Bank, the Lehigh Power Securities Corporation, the Duquesne Light Company, the Philadelphia Company, the Pittsburgh Utilities Corporation and others.

Mr. Menden, the president of the new company succeeding the Brooklyn Rapid Transit Company, has at last rightfully come into his own. It is indeed difficult adequately to describe Mr. Menden. He is the quiet, unassuming type of executive. The first impression of him is that he is inclined to be distant. This is only partly true. He is candid but not condescending. He had to submit to being photographed for the newspapers in connection with the announcement of his election as president, but he did it as a duty and not as a desire. This doesn't mean that there is anything of the fatalist about the man. Neither does it mean that he is indifferent to the interests of the public. It merely means, as Mr. Menden sees

it, that the interest of the public is in the accomplishments of the organization of which he is a part rather than in the man himself.

ENGINEER IN CHARGE OF SUBWAY WORK

The statement handed out to the newspapers reviewing Mr. Menden's career was doubtless prepared by Mr. Menden himself, for it contained merely the barest outline of the work of the man. Mr. Menden's service with the companies in Brooklyn dates back to 1905. Edwin W. Winter had recently taken charge of the work of rehabilitation after the passing of the Rossiter régime. Mr. Menden had made a name for himself as chief engineer of the Metropolitan West Side Elevated Railroad, Chicago, and he was selected to become chief engineer of the B. R. T., as principal engineering assistant to Mr. Winter. It soon became evident that Mr. Menden combined the rare qualities of both the engineer and the executive, and so in 1907 in addition to his duties as chief engineer he was appointed to the position of general superintendent, and the following year was made assistant general manager.

After the dual subway contracts were signed, in 1913, Mr. Menden was appointed chief engineer of the New York Municipal Railway Corporation, and as such directed for the company the work of constructing and equipping the rapid transit lines provided for in the contract with the city. In October, 1918, he was made chief engineer and assistant to the president of the Brooklyn Rapid Transit Company. Early in 1919 Mr. Menden was appointed assistant general manager for the receiver of the Brooklyn Rapid Transit Company and since October, 1919, he has held the position of general manager for the receiver.

Mr. Menden has, of course, been happiest when engaged in the important work of planning for and carrying out the extension and improvement of the system with which he has been identified. This has been almost a continuous performance since his connection commenced with the company, but the work has varied from time to time in its intensity. The great bulk of the rapid transit construction had been carried to completion previous to the appointment of the receivers for the company in 1918, but the receiver on his own account spent approximately $26,000,000 on the lines for new construction and the purchase of equipment during his incumbency. At the same time approximately $1,600,000 was expended on the surface lines for track reconstruction, car reconstruction, and new cars. Furthermore, the receiver spent out of earnings upward of $3,700,000 on the construction of the Williamsburg power plant.

PRESIDENT'S RECORD RECOGNIZED

All of this vast engineering and construction work was carried out under the direction of Mr. Menden and his election to the presidency is a mark of appreciation on the part of the new financial interests in the company of his very competent handling of both the engineering and management problems of a system of more than 700 miles of track, on which the revenue passengers on the rapid transit lines alone have increased in number from 280,295,291 in 1918 to 459,049,609 in 1922, and on the surface lines from 320,370,316 in 1918 to 465,865,137 in 1922. This is only a very small part of the whole story, but it is sufficient to indicate that Mr. Menden has long been the real "power behind the throne" in Brooklyn. That fact has now been recognized publicly.

RECEIVER PRAISED MR. MENDEN

In the report of the receiver to the court Mr. Garrison paid tribute to Mr. Menden with these words:

> I desire to take this occasion to acknowledge the help I have received from the services of the general manager, William S. Menden, and the able heads of the different departments. At every stage of the practical operation of the properties I have found them wise, competent and able. Under their operation of the property during the entire receivership period upward of 3,500,000,000 passengers have been carried by the system without serious accidents, and upward of $31,000,000 has been spent in new construction and betterments.

Mr. Menden was born in 1868 at Evansville, Ind. He was graduated from the Rose Polytechnic Institute, Terre Haute, Ind., in 1891 with the degree of civil engineer. He started work in the railway business in 1892 as rodman in the engineering department of the Metropolitan West Side Elevated Railway at Chicago, Ill. He remained with the Chicago Elevated Lines until 1905, serving in various capacities and finally as chief engineer of the system. As stated previously Mr. Menden resigned his connection at Chicago in 1905 to accept the position of chief engineer with the Brooklyn Rapid Transit System.

Mr. Feiker Joins Society for Electrical Development

F. M. Feiker, formerly vice-president of the McGraw-Hill Company, Inc., publisher of the ELECTRIC RAILWAY JOURNAL and more recently on leave of absence as special agent to the Department of Commerce at Washington, will after his return from Washington be associated with the staff of the Society for Electrical Development, 522 Fifth Avenue, New York City. As a result of the appointment of Mr. Feiker the various branches of the electrical industry served by the society will secure the benefit of his broad experience and background, for he will be available to act as a special counselor to engineers, manufacturers, central stations, jobbers, contractor-dealers and publishers, and his special training and wide knowledge in the engineering, publishing and public relations fields of many industries qualify him eminently for such consulting work. Mr. Feiker will retain a consulting relation to the McGraw-Hill Company, Inc., and he will continue in a similar capacity his relation to the problems of personnel and organization of the Department of Commerce at Washington.

New Commission Appointments in Missouri

Gov. Arthur M. Hyde of Missouri has appointed two more lawyers to the Missouri Public Service Commission. The new appointees are Thomas J. Brown, Republican, of Charleston, Mo., and R. M. Musser, Democrat, Plattsburgh, Mo. Mr. Brown's term expires on April 15, 1929, while Mr. Musser is to fill out the unexpired term of Hugh McIndoe, Joplin, who died several weeks ago. The term of office under this appointment expires on April 15, 1925.

J. P. Holt, former road master of the abandoned line of the Interurban Railway & Terminal Company, Cincinnati, Ohio, is now engineer of maintenance of the Cincinnati, Georgetown & Portsmouth Railway. He succeeded E. J. Jones, who has accepted a position in the maintenance department of the Cincinnati Traction Company.

Obituary

C. C. Baldwin

Chauncey C. Baldwin, for more than twenty years connected with the Standard Underground Cable Company at Perth Amboy, N. J., died on June 7, 1923, aged fifty-seven, after a brief illness. He had been one of the outstanding figures in the copper rolling and wire drawing industry for many years. His connection with the Standard Underground Cable Company dated from 1902 as superintendent and manager of its metal departments at Perth Amboy, including its copper melting furnaces and equipment for the production of copper and brass rods and wire, tubes, weatherproof and magnet wire products. In 1916 he was elected a vice-president of that company, which position he held at the time of his death.

John A. Kurtz

John A. Kurtz, chairman of the Missouri Public Service Commission, died suddenly on June 17 at the Jefferson City Country Club, where he had been playing golf with Attorney-General Barrett, Noah W. Simpson, until recently a member of the commission, and R. Perry Spencer, general counsel of the commission.

Mr. Kurtz succeeded William G. Busby as chairman of the commission on April 15, 1921. He was appointed by Governor Hyde for the full term of six years.

On May 28 Hugh McIndoe, a member of the commission, was striken with internal hemorrhages and died within an hour.

During Mr. Kurtz's connection with the commission many important rate cases were decided, notably the recent decision as to the rate-making valuation of the property of the United Railways, St. Louis.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Union Scale of Wages of Labor

A bulletin relating to the union scale of wages of labor throughout the United States as of May 15, 1922, and showing comparison with preceding years has just been issued by the Department of Labor. The bulletin embraces returns from sixty-six leading industrial cities and states the scale in twelve groups of industries embracing ninety-one trades and occupations, which reported an aggregate membership of 861,893. In the average for all trades taken collectively the hourly wage rate on May 15, 1922, was 6 per cent lower than on May 15, 1921; 69 per cent higher than in 1917, 93 per cent higher than in 1913, 104 per cent higher than in 1910 and 115 per cent higher than in 1907.

The average rates of wages per hour as of May 15, 1922, for the country as a whole for a few typical occupations were: Bakers 89.1 cents; bricklayers, $1.164; building laborers, 71.4 cents; carpenters, 97.3 cents; inside wiremen, $1.042; painters, $1.009; plasterers, $1.173; plumbers, $1.043; freight handlers, 65.1 cents; blacksmiths, 84.5 cents; machinists, 76.7 cents; iron molders, 74.6 cents; compositors, newspaper, day work, $1.004.

The average rate per hour May 15, 1922, for all building trades combined was 96.3 cents; for chauffeurs, teamsters, and drivers, 55.7 cents; for granite and stone cutters, $1.062; metal trades, 74.6 cents; printing trades in book and job offices, 89.2 cents; newspaper offices, $1.036, and for all trades covered by the report, 85.8 cents.

As compared with May 15, 1913, the rates per hour on May 15, 1922, showed an increase of 167 per cent for bakers, 68 per cent for bricklayers, 114 per cent for building laborers, 83 per cent for carpenters, 90 per cent for inside wiremen, 99 per cent for painters, 74 per cent for plasterers, 68 per cent for plumbers, 96 per cent for freight handlers, 98 per cent for blacksmiths, 93 per cent for machinists, 92 per cent for iron molders, and 76 per cent for compositors, newspaper, day work.

Swiss Electrification May Be Completed in 1928

The general management of the Swiss Federal Railways has submitted a report to the board of directors, which has been approved by the latter, regarding the electrification of these lines.

A report to the Department of Commerce at Washington states that if the Federal Assembly will approve the program of acceleration for this work and vote a subsidy of about $12,000,000 to assist in defraying the expense involved all the principal lines of these railways will be electrified at the end of 1928—in all, 950 miles. There are 250 miles already electrified, and electrification work is in progress on 240 miles additional. The cost of this work will be about $150,000,000, of which approximately $60,000,000 was spent from 1907 to the end of 1922.

It is estimated that as soon as the traffic density shall have attained that of 1923 the electrical operation of these lines will not be any more expensive than steam operation with coal at $12 a ton. Should the traffic density surpass that of 1913 the cost of electrical operation will relatively decrease and will equal steam operation at a cost price of coal of only $9 a ton.

Destructive Fire at Plant of Columbia Machine & Malleable Iron Company

A serious fire occurred in the shops of the Columbia Machine & Malleable Iron Company, 169 Chestnut Street, Brooklyn, Thursday afternoon, June 21. The one-story structure on Chestnut Street was badly damaged and several of the small frame buildings adjacent were destroyed.

When a representative of the ELECTRIC RAILWAY JOURNAL talked with the officials of the company Friday morning they were unable to give any accurate estimate as to the extent of the loss. They stated, however, that reconstruction would begin immediately and that they hoped to have the greater part of the plant in operation within a week or ten days. Special effort will be made by the officials of the company to give deliveries on rush orders as soon as possible.

Fifty New Cars to Be Purchased for Brooklyn

The expenditure of more than $1,750,000 on new equipment and improvements for the new Brooklyn-Manhattan Transit Corporation, the successor to the Brooklyn Rapid Transit Company, was voted by the directors at their first meeting on June 18. Of this amount $1,250,000 will be for the purchase of fifty new cars. About $580,000 will be expended for cables and substations. The new cars will be ordered at once for delivery during the coming fall. They are to be of the type now in use.

Under the plans for reorganizing the B. R. T. $5,000,000 was provided for improvements, and this is the first expenditure from that sum. No other expenditures for improvement are to be made until a careful plan has been worked out.

The expenditure for cables, equipment and substations was explained in a statement that read in part:

> On account of the increase in service on certain lines of the company, particularly in South Brooklyn, it is necessary to provide additional substation equipment, including an additional substation building and equipment on the Sea Beach line at Avenue T.

Other improvements included feeder cables, new rotary converters in power houses and additions and alterations to the King's Highway substation.

Retail Food Price Goes Up

The retail food index issued by the Department of Labor through the Bureau of Labor Statistics shows that there was an increase of two-tenths of 1 per cent in the retail cost of food to the average family in May, 1923, as compared with April, 1923. In May, 1923, the index number was the same as in April, 1923, 143.

Shares Offered to Westinghouse Employees

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has announced a plan whereby all employees may participate in the purchase of a new issue of 20,000 shares of common stock to be paid for on the deferred plan at $53 a share (par value $50). Each employee may subscribe for one to twenty shares of stock and pay for it in ten consecutive monthly installments. No interest will be charged on the deferred subscription payments. When the final payment on each stock subscription becomes due, dividends at the rate declared and paid on the company's common stock after Aug. 1, 1923, when the plan goes into effect, will be credited to the account of each subscriber.

This plan will in no way interfere with the insurance saving fund now in force. In the latter plan the employee by depositing 2 per cent of his salary in a 4½ per cent interest-bearing savings fund obtains additional insurance up to $1,500 over the $500 given by the company after six months' service. Subscription rights are for the benefit of the employee and are not transferable.

Metal, Coal and Material Prices

Metals—New York	June 19
Copper, electrolytic, cents per lb.	15.075
Copper wire base, cents per lb.	18.00
Lead, cents per lb.	7.25
Zinc, cents per lb.	6.25
Tin, Straits, cents per lb.	40.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.875
Somerset mine run, Boston, net tons	2.75
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	1.80
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$7.75
Weatherproof wire base, N. Y., cents per lb.	19.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$1.15
White lead, in oil (100-lb. keg), N. Y., cents per lb.	13.125
Turpentine, (bbl. lots), N.Y., per gal.	$1.05

Rolling Stock

Abilene Street Railway has purchased a new one-man all-steel car, which has already been put in operation.

Eureka, Calif.—The contract for furnishing the Eureka Street Railway with 20 tons of car wheels has been awarded to the Griffin Wheel Company. The amount is $67 a ton.

Brooklyn-Manhattan Transit Corporation, successor to the Brooklyn Rapid Transit Company, has included in a program of improvements just announced the purchase of fifty new cars for use in rapid transit service.

Lima & Defiance Railroad, Lima, Ohio, will place an order about July 1 for three passenger and two baggage cars. These cars are to be gasoline propelled. The seating capacity of the passenger cars will be forty-four.

Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, has purchased four new steel passenger cars, costing $16,000 each. They will be received some time this month to be used between Toledo and Bay Point.

Philadelphia Rapid Transit Company, Philadelphia, Pa., ordered on June 1 nine trackless trolleys. The builder is the J. G. Brill Company. Electrical equipment will be furnished by the General Electric Company. Specifications follow:

Seating capacity	30
Style of seats	5 longitudinal, 4 cross
Type of control	K
Type of motors	G. E.-258
Length of route	5.8 miles
Length of body over vestibules	23 ft. 2½ in.
Width over all	7 ft. 6 in.
Type of tires	Overman

Durham Public Service Company has placed an order for four cars to be delivered on Sept. 1. The specifications of these cars are as follows:

Builder of car body	P. A. Thomas
Type of car	Passenger, four motor
Seating capacity	52
Total weight	27,000 lb.
Bolster centers	17 ft.
Length over all	39 ft. 1½ in.
Truck wheelbase	5 ft. 2 in.
Width over all	8 ft. 2½ in.
Height, rail to trolley base	10 ft. 5¼ in.
Body	Steel
Interior trim	Birch
Roof	Arch
Air brakes	Westinghouse Traction Brake
Car signal system	Faraday
Control	Westinghouse K-35
Curtain fixtures	Rex.
Curtain material	Pantasote
Fare boxes	Johnson
Wheelguards	H. B. life guard
Gears and pinions	Nuttall, helical
Lightning arresters	Westinghouse
Motors	Four Westinghouse No. 510, 35 hp.
Seats	Hale & Kilburn
Seating material	Birch
Slack adjuster	None
Trolley base	Ohio Brass Company
Trucks	Taylor, R. H. Double truck
Ventilators	Railway Utility Company double exhaust
Wheels	26 in., C. I.

Track and Roadway

Los Angeles Railway has completed the double tracking of Temple Street to Willowbrook Avenue. The line is now in operation. Work started recently on the Olive Street track between Fifth and Sixth. New ties, ballast and rail will be installed.

Brantford, Ont.—The City Council has authorized electric railway repairs and improvements costing $40,000.

Hutchinson Interurban Railway, Hutchinson, Kan., expects to pave Washington Street from Fourth Avenue to Fifth Avenue.

San Francisco-Oakland Terminal Railways will spend a total of $240,000 on track reconstruction along Telegraph Avenue. Work on the track in Oakland, between Fifty-fourth Street and the Berkeley line, will cost $140,000. An additional $100,000 will be required to reconstruct the track in Berkeley as soon as the city completes its paving work on the avenue.

El Paso & Juarez Traction Company, El Paso, Tex., will extend its railway system in Juarez. An amended concession has just been granted this company by the Mexican Government, under the provisions of which the company has obligated itself to build a new steel and concrete bridge across the Rio Grande, connecting Juarez will El Paso. The proposed structure will cost about $200,000.

San Antonio, Tex.—Construction of the proposed interurban electric railway between San Antonio and some point in the Lower Rio Grande Valley will be started as soon as the survey which is now being made is finished and the right-of-way obtained, according to V. H. Williams, Dallas, who is largely interested in financing the project. The road will be about 225 miles long. Mr. Williams and associates have purchased a large bed of lignite in McMullin County, close to the route of the proposed road, and will build an electric power plant there, using the lignite for fuel.

Power Houses, Shops and Buildings

Illinois Power & Light Company, Peoria, Ill., in view of the rapidly increasing demand in the field of electric power and light, will install approximately 100,000 hp. in or near existing stations and will later construct one or more super-power houses.

New Orleans Public Service, Inc., has awarded a contract to the Phoenix Utility Company, New York, with branch offices at New Orleans, for the construction of several projects involving an expenditure of approximately $600,000. The contract was on the cost plus basis. The work includes construction of a reinforced concrete building 63 ft. x 151 ft., substation at Polymnia and Baronne Streets, estimated at $300,000; remodeling and extending the boiler house at Market and South Peters Streets, estimated to cost $100,000; construction of three oil storage tanks at cost of $50,000 each and remodeling and extending several substations.

Trade Notes

Osgood Bradley Car Company, Worcester, Mass., has begun work on a contract for thirty trolley cars for the Boston Elevated Railway, which when completed will represent an outlay of approximately $500,000. They are double-truck safety type surface cars.

A. R. McLean announces the opening in Norfolk, at the Board of Trade Building, of his own business, engaging in general secret service work for steam and electric railways as well as for other corporations. The business will be known as the McLean Secret Service Bureau. On June 1 Mr. McLean resigned as general manager of the Corporation Service Bureau, Cleveland.

Uehling Instrument Company, Paterson, N. J., manufacturers of CO_2 recorders and draft and vacuum gages, has just made two important agency appointments, namely, Amsler-Morton Company, Fulton Building, Pittsburgh, for western Pennsylvania, and John A. MacDowell, 2039 Railway Exchange Building, St. Louis, for eastern Missouri and southern Illinois. H. R. N. Johnson, who formerly represented the Uehling Instrument Company in Minnesota and the Dakotas, has joined the W. P. Nevins Company, 120 South Ninth Street, Minneapolis. This company is now the official Uehling representative in the territory mentioned.

New Advertising Literature

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has just issued Vol. III, No. 3 of its electrification data series, dealing with the Chilean State Railway electrification. The booklet, which contains twenty pages and is amply illustrated with photographs and drawings, explains the problem that the Chilean Railway officials had to solve.

Detroit Underfeed Stoker Company's level fuel bed multiple retort underfeed stoker is illustrated and described in detail in the new bulletin "Built on Advanced Engineering Principles," just published by the manufacturer. Among other subjects it covers the practical application of principles of combustion in the design and construction of a high-duty machine to meet modern requirements.

Graver Corporation, Chicago, has just issued a booklet on its Zeolite and hot process methods of water softening. Analyses of raw water and water softened by both processes are given and points of comparison between the two methods are included. Attention is also called to a number of bulletins descriptive of Graver water softening and purification equipment. These include such topics as water supply for horizontal and vertical pressure-type filters; hot process, continuous, Zeolite, and intermittent water softeners.



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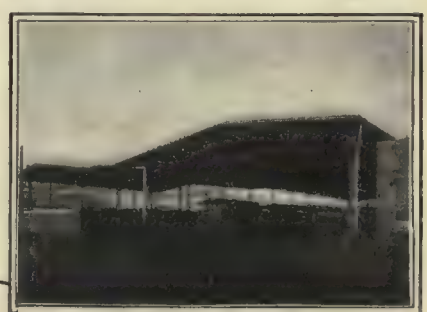
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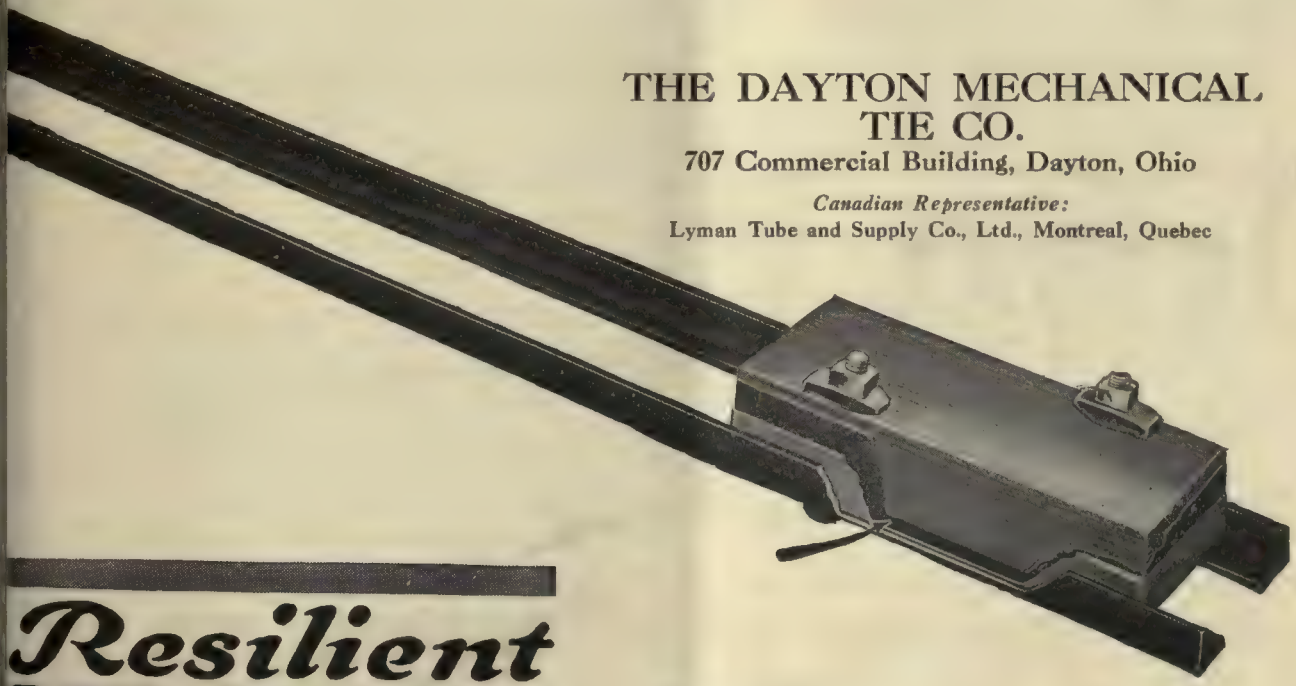
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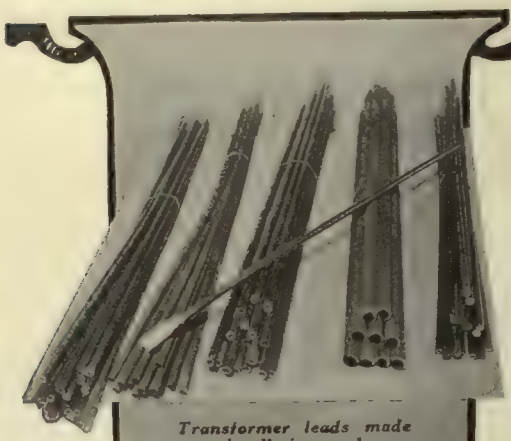


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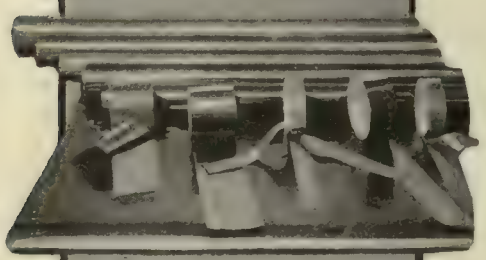
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Established 1905

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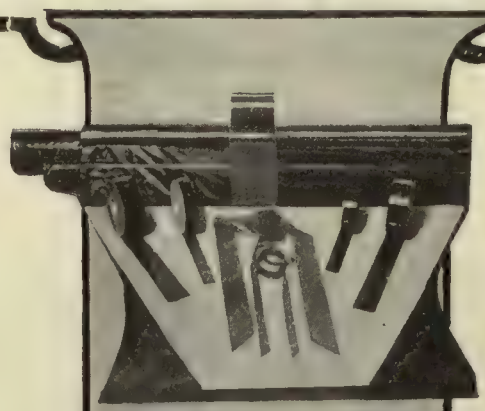
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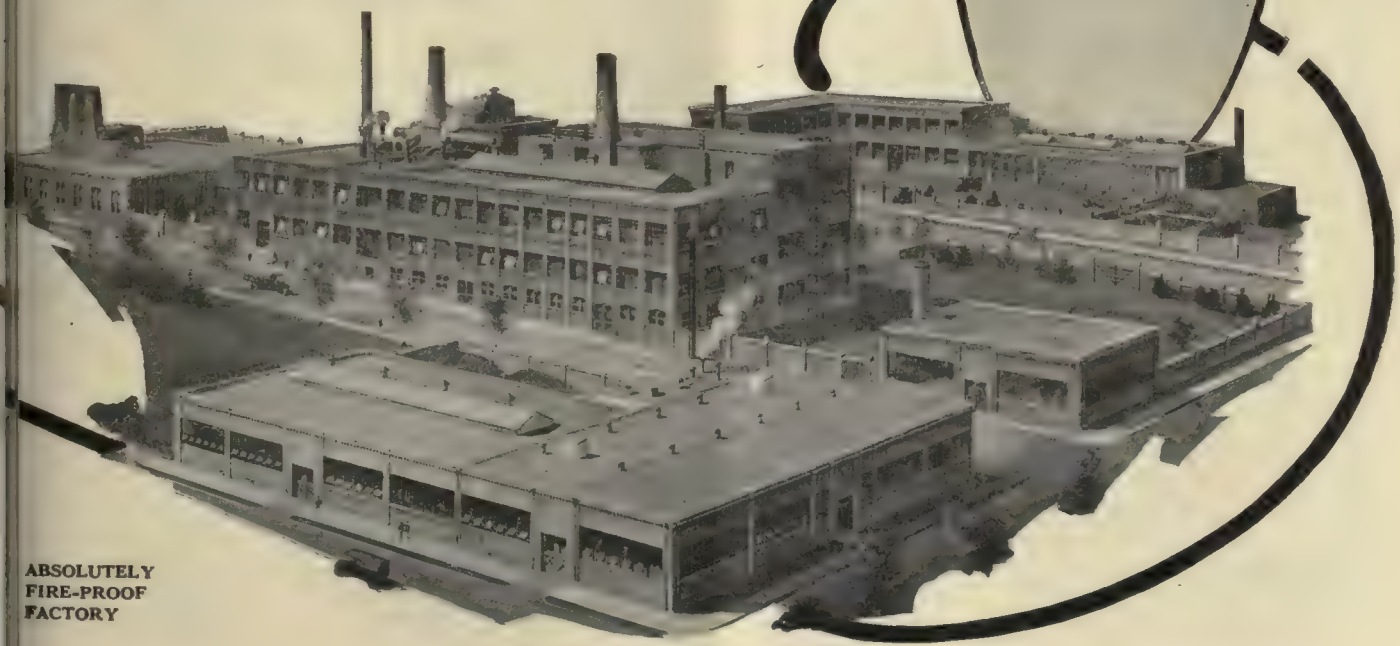
IRVINGTON SEAMLESS BIAS TAPE varnished cambric is made in widths of ½ in. and wider. Length 36 and 72 yard rolls. Thickness .007 to .015 in. The advantages of a SEAMLESS over a sewed bias tape are: It can be continuously wound without the necessity of stopping to cut out seams. Absence of seam avoids air pockets and the consequent lowering of dielectric at that spot. Can be wound with a taping machine. Will successfully supplant method of insulating with linen tape and the subsequent impregnation with insulating varnish.



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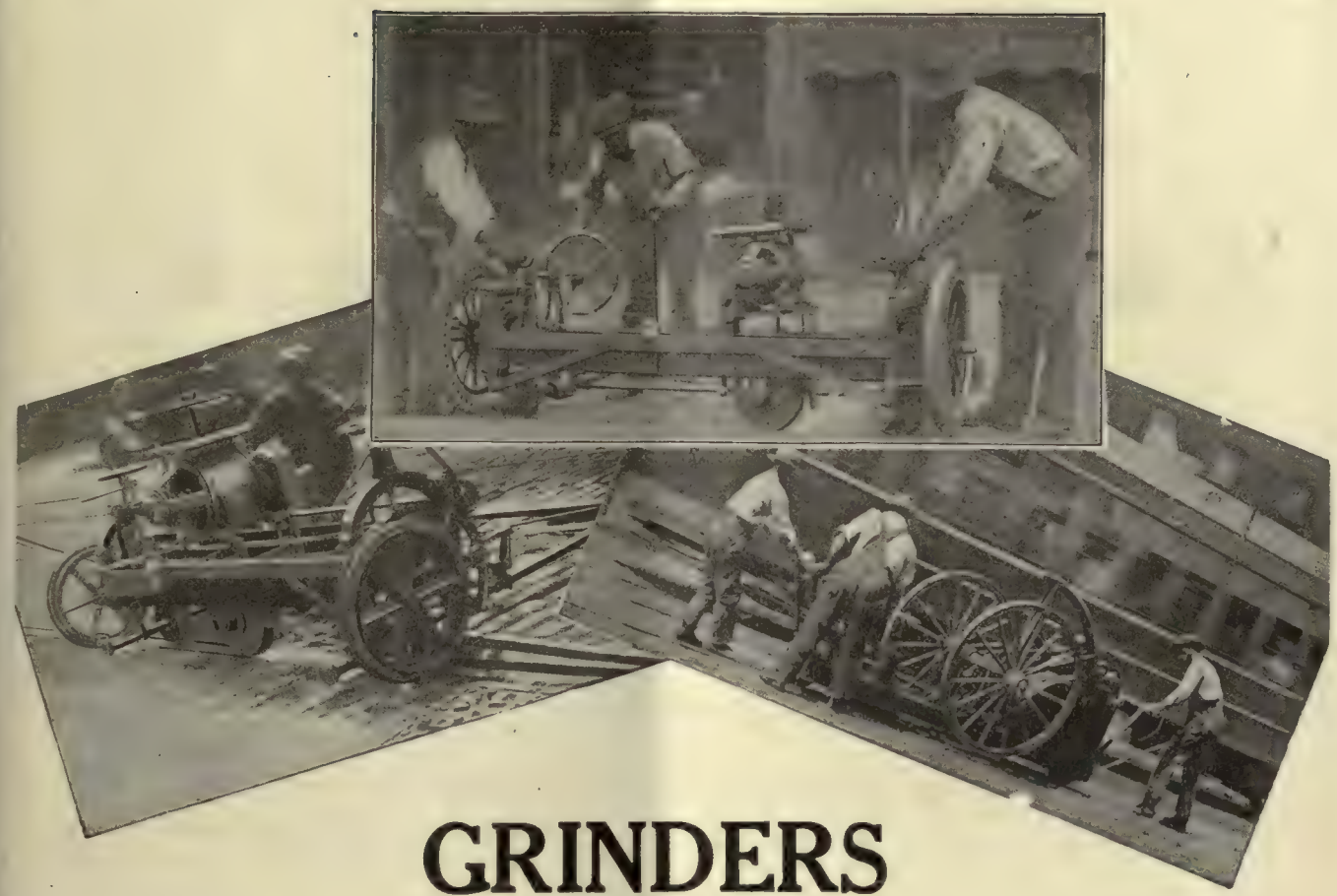
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"Atlas"

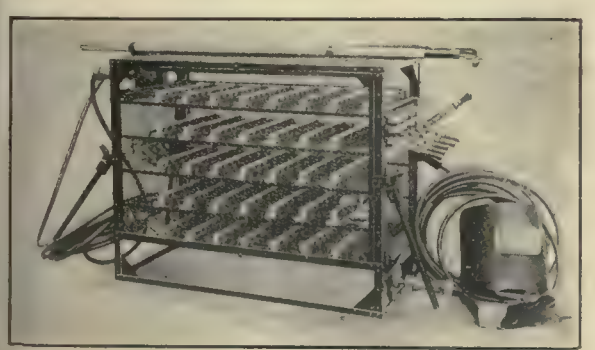
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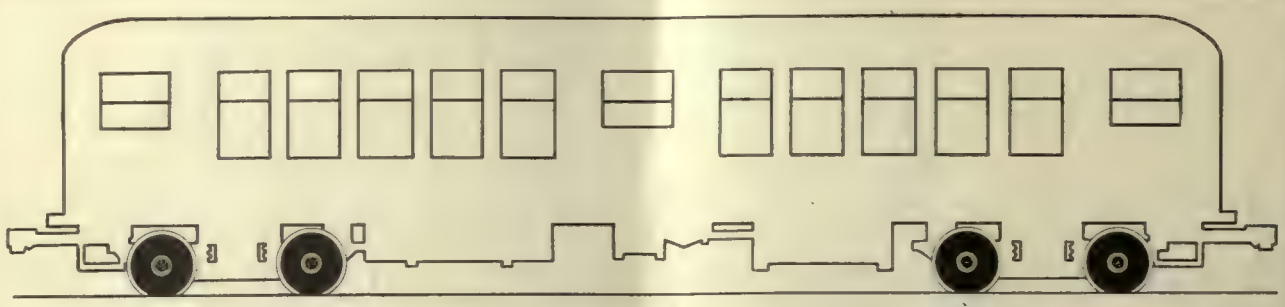
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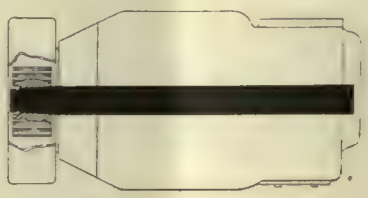
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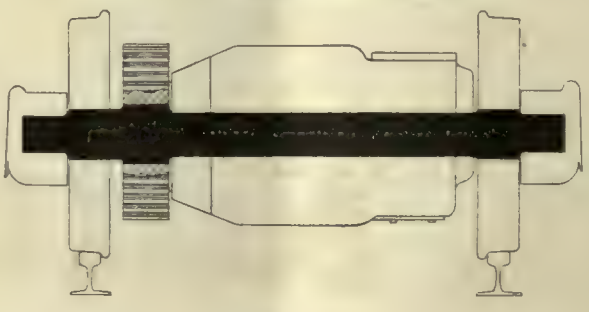
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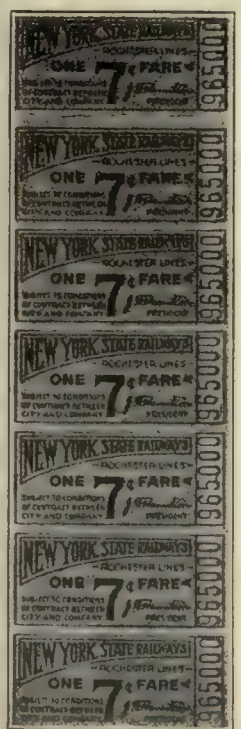
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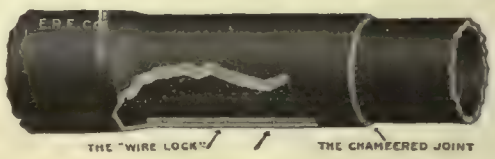
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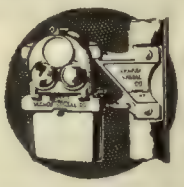
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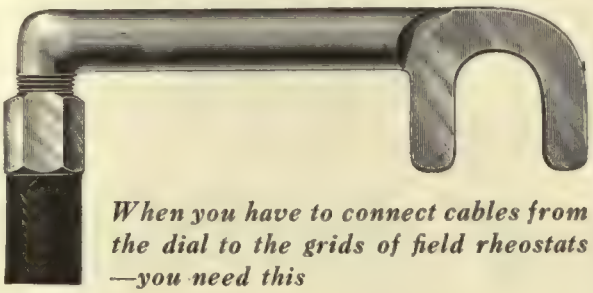
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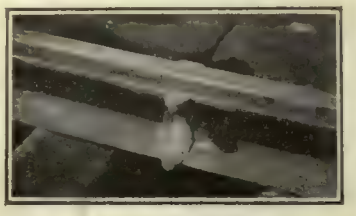
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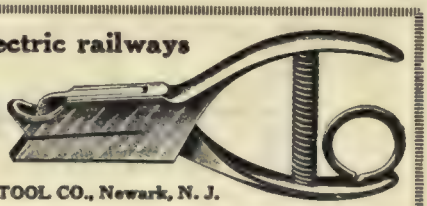
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Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE and ECONOMY.**

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY

Manufacturers of bell, signal and other cords.

Newtonville, Massachusetts



Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.

15 South Throop Street, Chicago, Illinois



SHOCKS

have little effect on

AJAX CHECK PLATES

because these plates are made from Ajax Perfecto Bronze

The strongest and toughest metal on the market. They will bend before they will break and give longest possible service.

The Ajax Metal Company

Established 1880

Philadelphia, Pa.

NEW YORK CHICAGO BOSTON CLEVELAND

RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also **ELECTRIC THERMOMETER CONTROL**
of Car Temperatures.

141-151 West 22d St. Chicago, Ill. — *Write for Catalogue* — **1328 Broadway New York, N. Y.**

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



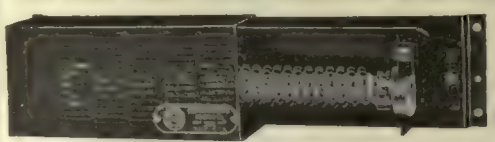
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Sells Transportation

Let our experts on railway car finishing demonstrate Beckwith Chandler paints and varnishes. Write for details.

Beckwith-Chandler Co., 203 Emmett St., Newark, N. J.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

STEEL

'CARNEGIE'

When you think of Steel—think of Carnegie

Fare Boxes ***Change Carriers***

COIN

COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.

CLEVELAND, OHIO

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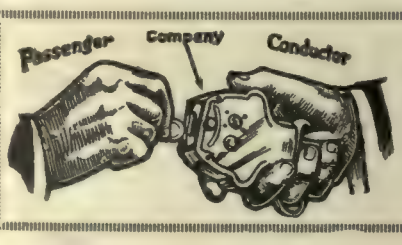
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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. **Write for details.**

The Peter Smith Heater Company

1725 Mt. Elliott Ave., Detroit, Mich.



Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.

Providence, R. I.

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EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

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Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

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E. R. J.

POSITIONS VACANT

MAN wanted; experienced in the repair and maintenance of electric motors and controllers. Gary Street Railway, 567 Broadway, Gary, Ind.

TWO master mechanics wanted, 1 for city with 45 city cars, 1 for interurban with 40 interurban cars. Both shops located in the Middle West. Have good shops, tools and machinery. P-567, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

MANAGER or superintendent railway, light and power properties, technical successful organizer and tactful in public relations and very resourceful in rehabilitating properties. Member A.I.E.E. Available in 30 days. PW-557, Elec. Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

WANTED position as R. M., supervisor or inspector by man twenty years on electric railways. Best of references. Available on short notice. Interview. PW-560, Elec. Railway Journal, 10th Ave. at 36th St., New York.

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20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

6 Oil Tank Cars

for electric railways, 5,000 gallon capacity. Also half mile of Industrial Track with track scales, turntable, steel ties and 16 steel side-dump cars to go with same at exceptionally low price for quick sale. Wire, phone or write.

Tate, Fisher & Rice Company
258 Washington St., Boston, Mass.

FOR SALE

25-Ton All Steel

BALDWIN ELECTRIC LOCOMOTIVE

Fully Equipped

Excellent Condition

Immediate Delivery

FS-566, Electric Railway Journal
10th Ave. at 36th St., New York City

FOR SALE

One Electric Railway Improvement Co.'s

Rail Bonding Car

This car is in good workable condition. Inquiries to be made of Purchasing Department.

San Diego Electric Railway Co.,
San Diego, Calif.

New Motor Repair Parts

IMMEDIATE SHIPMENT

We have in stock virtually every part necessary to complete all of the types of non-interpole motors. They are new and were manufactured by either the Westinghouse Company or the General Electric Company. They may be purchased at 25 per cent less than the manufacturers' present prices.

Send your orders to us and deduct 25 per cent from the current quotations.

What have you for sale?

TRANSIT EQUIPMENT CO.
Cars—Motors
501 Fifth Avenue, New York

FOR SALE

Two—4 cylinder Reo Motor 15 Passenger Busses

Mounted on Standard Steel RR Wheels and Axels

Also a 13-foot Long Box Car Trailer

All in Good Condition

A very handy, convenient and economical outfit for a small railroad

Also the original tires and axels to readjust for general road work

WRITE FOR PHOTO AND PARTICULARS

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Hyman-Michaels Company
531 Peoples Gas Bldg., Chicago

1500 Tons

85 lb. A. S. C. E. Section

Relaying Rails with Angle Bars

Immediate Shipment

Central South and Southwestern delivery

S. W. LINDHEIMER
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Rails and Track Material

"Opportunity" Advertising:

Think "*SEARCHLIGHT*" First!

0098

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Electric Service Sup. Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
St. Louis Car Co.
Standard Steel Works Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Babbitt Metal
Ajax Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The

Bearings an Bearing Metals
Ajax Metal Co.
Baldwin Locomotive Works
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Westinghouse E. & M. Co.

Bearings Center and Roller Side
Stucki Co., A.

Bearings, Roller
Stafford Roller Bearing Car Truck Corp.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.

Boilers
Babcock & Wilcox Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties Posts, etc.)
Bates Exp. Steel & Tr. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.

Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Inc.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

Brushes, Graphite
U. S. Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings
National Vulcanized Fibre Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Bus Seats
Hale & Kilburn
Heywood-Wakefield Co.

Cables (See Wires and Cables)

Cambric, Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes Carbon)

Car Lighting Fixtures
Electric Service Sup. Co.

Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.

Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.

Cars, Gas Rail
St. Louis Car Co.

Cars, Passenger, Freight Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

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Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Catchers and Retrievers, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Change Carriers
Cleveland Fare Box Co.

Circuit Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Rome Wire Co.

Coils, Choke and Kicking
General Electric Co.
Westinghouse E. & M. Co.

Coin-Counting Machines
Cleveland Fare Box Co.
Electric Service Sup. Co.
Internat'l Register Co., The

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrapping Machines
Cleveland Fare Box Co.

Commutator Slotters
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
Westinghouse E. & M. Co.

Compounds (Insulating & Splicing)
Johns-Manville Inc.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air, Portable
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Condensor, Papers
Irvington Varnish & Ins. Co.

Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car-Heat'g Co.
Electric Service Sup. Co.
Ohio Brass Co.

Controllers or Parts
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General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Electric Service Sup. Co.

Controlling Systems
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Westinghouse E. & M. Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Copper Wire
Anaconda Copper Min. Co.
Page Steel & Wire Co.

Cord Adjusters
National Vulcanized Fibre Co.

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Electric Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Electric Service Sup. Co.
Samson Cordage Works
Wood, Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cranes
Allis-Chalmers Mfg. Co.

Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.

Crossing Foundations
International Steel Tie Co.

Crossing Frog and Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.

Crossing, Manganese
Ramapo Ajax Corp.

Crossings Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Crushers, Rock
Allis-Chalmers Mfg. Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Sup. Co.
Morton Mfg. Co.

Dealers Machinery
Electric Equipment Co.
General Electric Co.

Derailing Devices (See Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

Detective Service
Wish Service, P. Edward

Door Operating Devices
Con. Car-Heating Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Sup. Co.

Ears
Ohio Brass Co.

Ebony Asbestos Wood
Johns-Manville Inc.

Electrical Wires and Cables
Amer. Electrical Works
American Steel & Wire Co.
Roebling's Sons Co., J. A.

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Railway Track-Work Co.

Electrodes, Carbon
Railway Track-Work Co.

Electrodes, Steel
Railway Track-Work Co.

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Beckwith-Chandler Co.

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Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Day & Zimmerman
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Inc., Dwight P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Engineering Corp., The J. G.
Wortham, Edwin

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Johns-Manville Inc.

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Ramapo Ajax Corp.

Frogs, Track (See Track Work)
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Frogs, Trolley
Ohio Brass Co.

Furnaces, Electric
Pittsburgh Elec. Furnace Corp.

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Consolidated Car-Heating Co.
General Electric Co.
Westinghouse E. & M. Co.

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Columbia M. W. & M. I. Co.

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Ohio Brass Co.

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Power Specialty Co.
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Columbia M. W. & M. I. Co.
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Grinders, Portable
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Ohio Brass Co.

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Harps, Trolley
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Electric Service Sup. Co.
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Star Brass Works
Thornton Trolley Wheel Co.

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General Electric Co.
Ohio Brass Co.

Heaters, Car (Electric)
Consolidated Car-Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

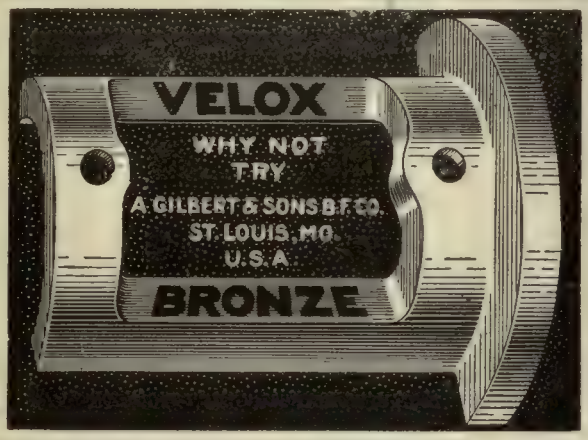
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Tests Prove That Fewer Inspections Are Required

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Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky





"Imperial" Pneumatic Tie Tampers

Reduce track tamping and maintenance costs.

Ask for Bulletin 9123

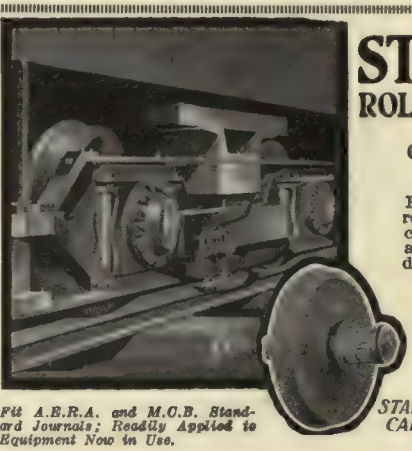
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KALAMAZOO, MICH., U. S. A.



STAFFORD ROLLER BEARINGS

Cut Power Requirements in Half

Prevent hot boxes and resulting journal troubles; check end thrust and do away with all lubrication difficulties BECAUSE—

They Eliminate Journal Friction

Guaranteed Two Years

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LAWTON, MICH. U.S.A.

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.



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Findlay, Ohio



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Found The World Over

The No-Staff Brake for any size and type of car

Apply the advantages of the staffless brake with its space-saving features, to all your cars. Ackley No-Staff Brakes are adaptable to any kind of service. The eccentric chain-winding drum insures quickest applications and maximum power.

Price only $32.00

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Hydraulic Machinery
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Industrial Flooring
Johns-Manville Inc.
Instruments, Measuring and Recording
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General Electric Co.
Westinghouse E. & M. Co.
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General Electric Co.
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Johns-Manville Inc.
National Vulcanized Fibre Co.
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Irvington Varnish & Ins. Co.
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Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville Inc.
Okonite Co.
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Irvington Varnish & Ins. Co.
Insulators
(See also Line Material)
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General Electric Co.
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Ohio Brass Co.
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Electric Service Sup. Co.
Hubbard & Co.
Insulators, High Voltage
Lapp Insulator Co.
Insurance, Fire
Marsh & McLennan
Jacks (See also Cranes, Hoists and Lifts
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Buda Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
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(See Rail Joints)
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Bemis Car Truck Co.
Brill Co., The J. G.
Junction Boxes
Standard Underground Cable Co.
Lamp Guards and Fixtures
Anderson Mfg. Co., A. & J. M.
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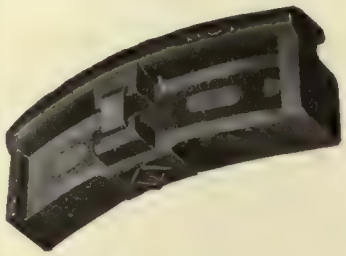
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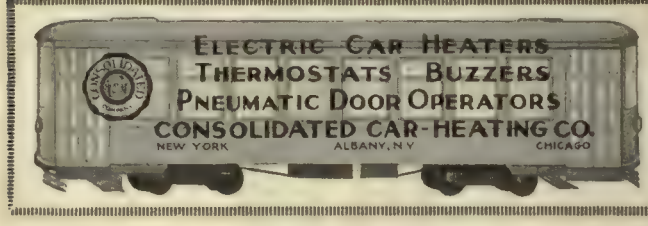
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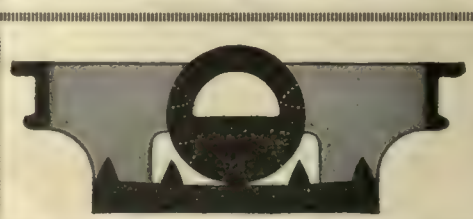


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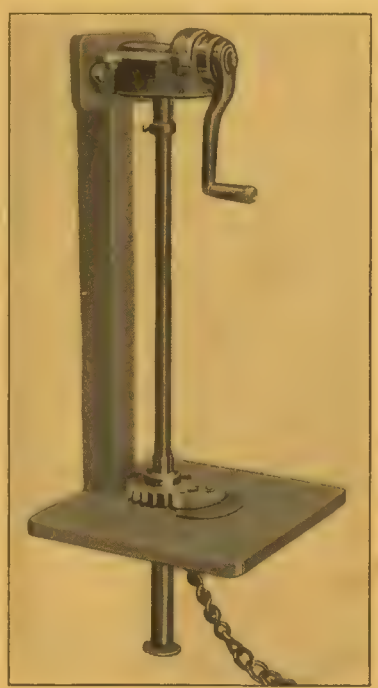
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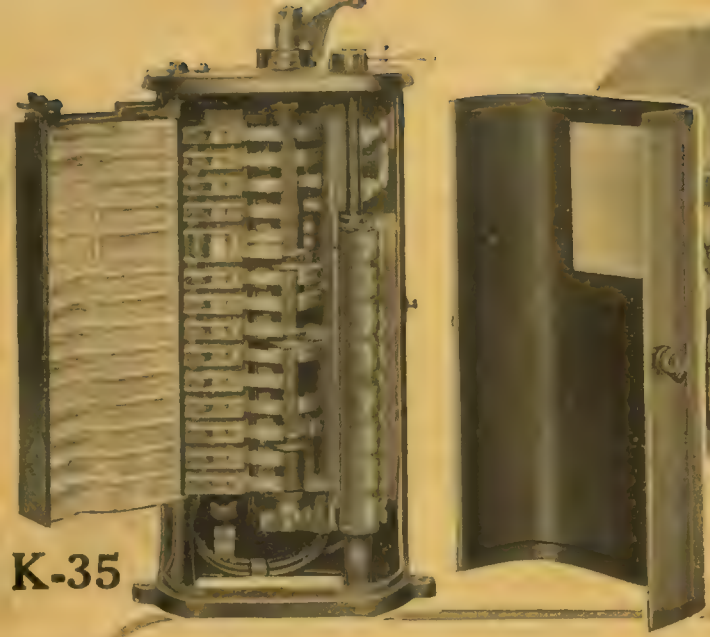
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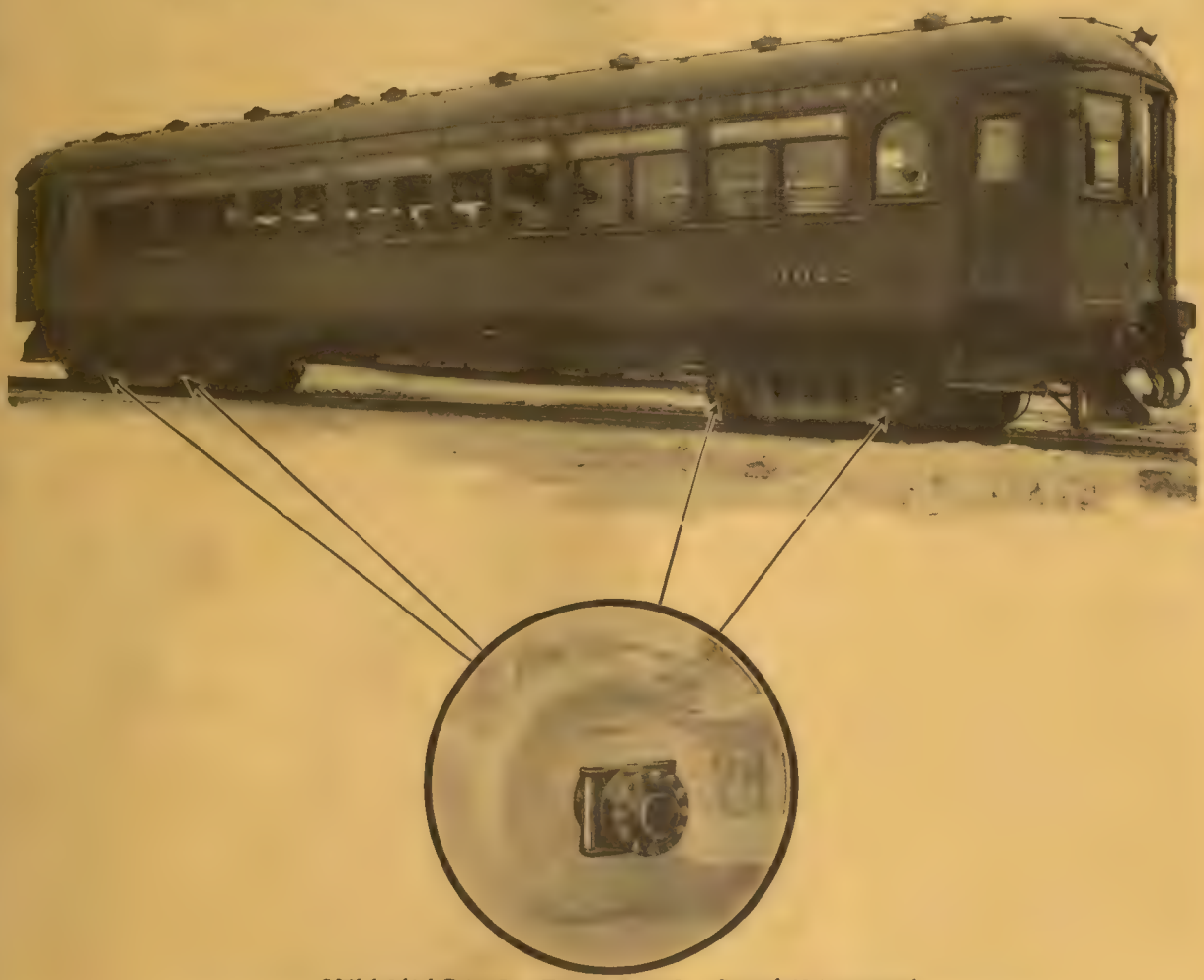
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ELECTRIC RAILWAY JOURNAL

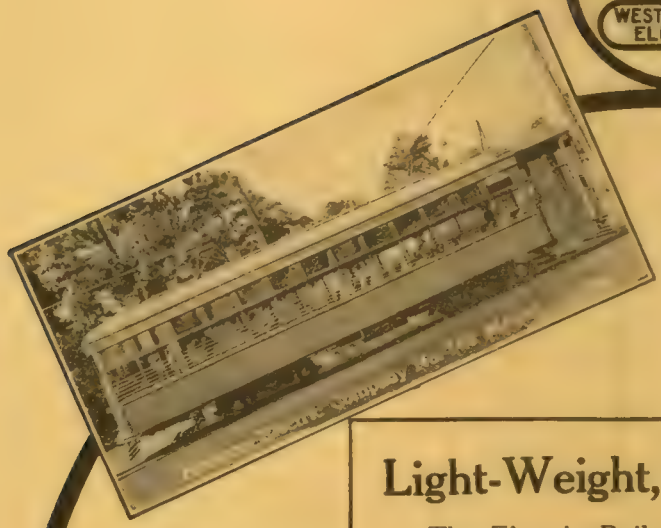
MAKE CARS COAST 6 TIMES AS FAR

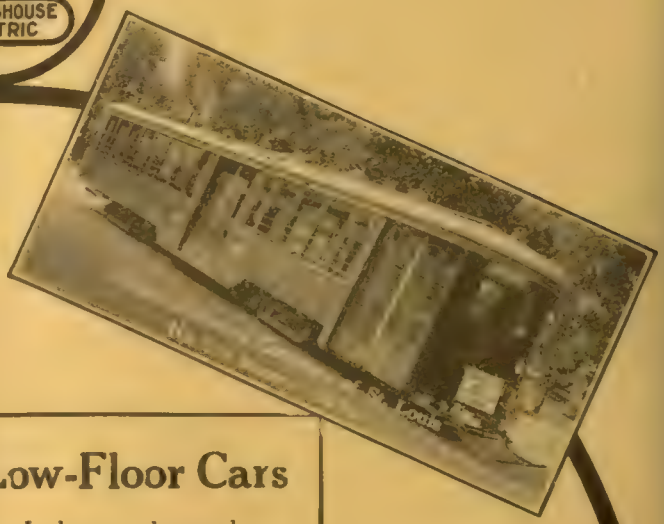
We Have the Proof—Demand It



STAFFORD ROLLER BEARINGS

STAFFORD ROLLER BEARING CAR TRUCK CORPORATION
LAWTON MICHIGAN
"IT ROLLS THE FRICTION AWAY"





Light-Weight, Low-Floor Cars

The Electric Railway Industry demands rolling stock capable of efficiently transporting great masses of people in short periods of time. Light-weight, low-floor cars, which may be operated by either one or two men and which may be arranged to operate as single cars or in trains of two or three cars, are meeting the exacting requirements in many of our large cities.

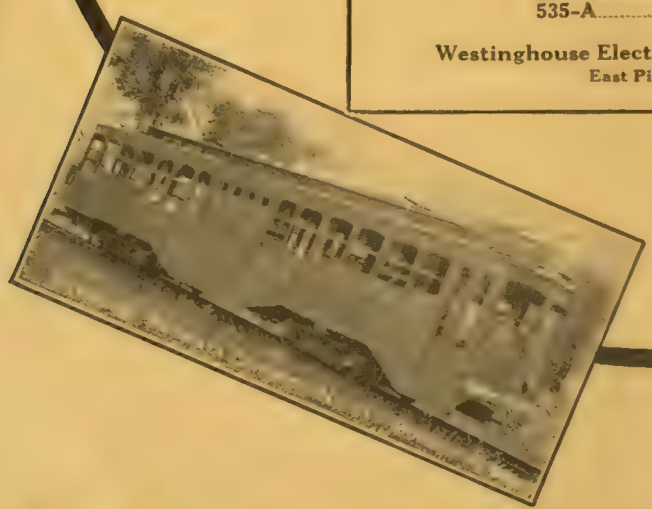
The necessity of rapid acceleration and high-schedule speeds makes it very important that the proper size of motor unit is applied.

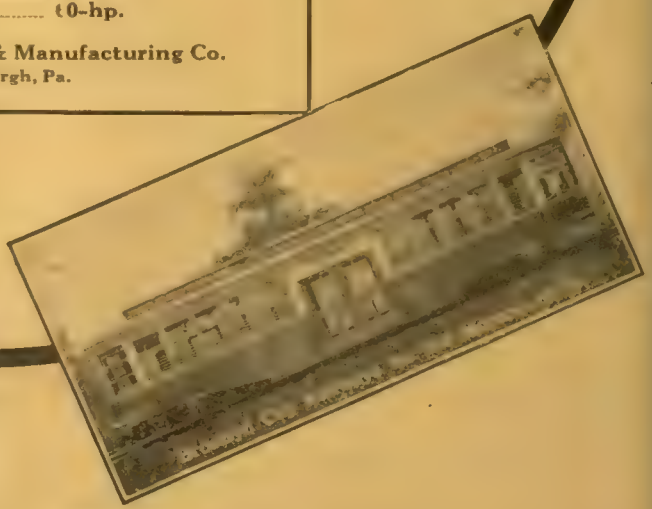
Standard Westinghouse Motors are designed to meet a wide range of service conditions. Let us assist you to select—

A MOTOR FOR YOUR SERVICE:

508-A	25-hp.
510-A	35-hp.
514-A	40-hp.
535-A	60-hp.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.





Westinghouse

New York, June 30, 1923 Pages 1071-1106

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U. S. A.

"You Are Cordially Invited—"

IN ORDER that our readers may become better acquainted with the incomparable facilities used in publishing the ELECTRIC RAILWAY JOURNAL, we have planned a personally conducted inspection trip—via this page—through the principal departments within the thirteen-story House of McGraw-Hill in New York. The tour will start July 7. You will see the giant presses at work, watch the skilled linotype operators, visit the copywriting staff, call on the advertising artists, inspect the interesting technical illustration department, view the expansive circulation, subscription and other departments, observe your paper being bound, wrapped and mailed, and then return to the restful library and bright, cheerful editorial offices.

After that trip you will have a new idea of the magnitude of our establishment and know why the McGraw-Hill publications have character and dependability not found in the usual business paper. But this tour of the McGraw-Hill plant will be a poor substitute for a personal visit on your part, and it is hoped that it may inspire you to call upon us and "see for yourself" on your next trip to New York.

The publications range from ELECTRIC RAILWAY JOURNAL, which is among the oldest of the present family of fourteen papers, and first "baby" of James H. McGraw, to *Bus Transportation*, a sturdy, fast-growing yearling—an extension of ELECTRIC RAILWAY JOURNAL service. Each of the fourteen publications from the House of McGraw-Hill is the leader in its field, but perhaps none is closer to its field than is the JOURNAL.

Number of Copies Printed, 5,900

Advertising Index—Alphabetical, 62; Classified, 58, 60; Searchlight Section, 57

Insurance plus Marsh & McLennan Service

OTHER THINGS BEING EQUAL—Marsh and McLennan would not be carrying the insurance for a great number of the largest public utilities in America.

The public is no more interested in where you buy your insurance than it is interested in where you buy your rails or cars or other equipment.

Marsh & McLennan solicit your insurance solely because they can render you a service that will decrease your insurance costs.

On one large Eastern Corporation, for example, we were able to reduce the insurance rate from $17.50 per thousand to $4.30 per thousand. Why not buy your insurance where you can buy the most for your money?

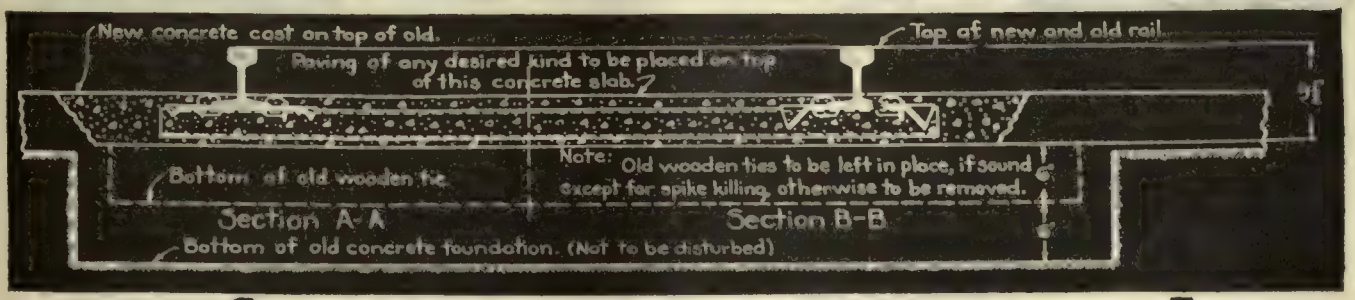
We will be glad to outline this service to business executives who are interested in reducing insurance costs.

MARSH & McLENNAN

175 W. Jackson Blvd. Chicago, Ill.

Minneapolis	Denver	San Francisco	Winnipeg
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In 1921 and 1922 Twin Ties Saved 29,496 Lineal Feet of Old Concrete Track Base

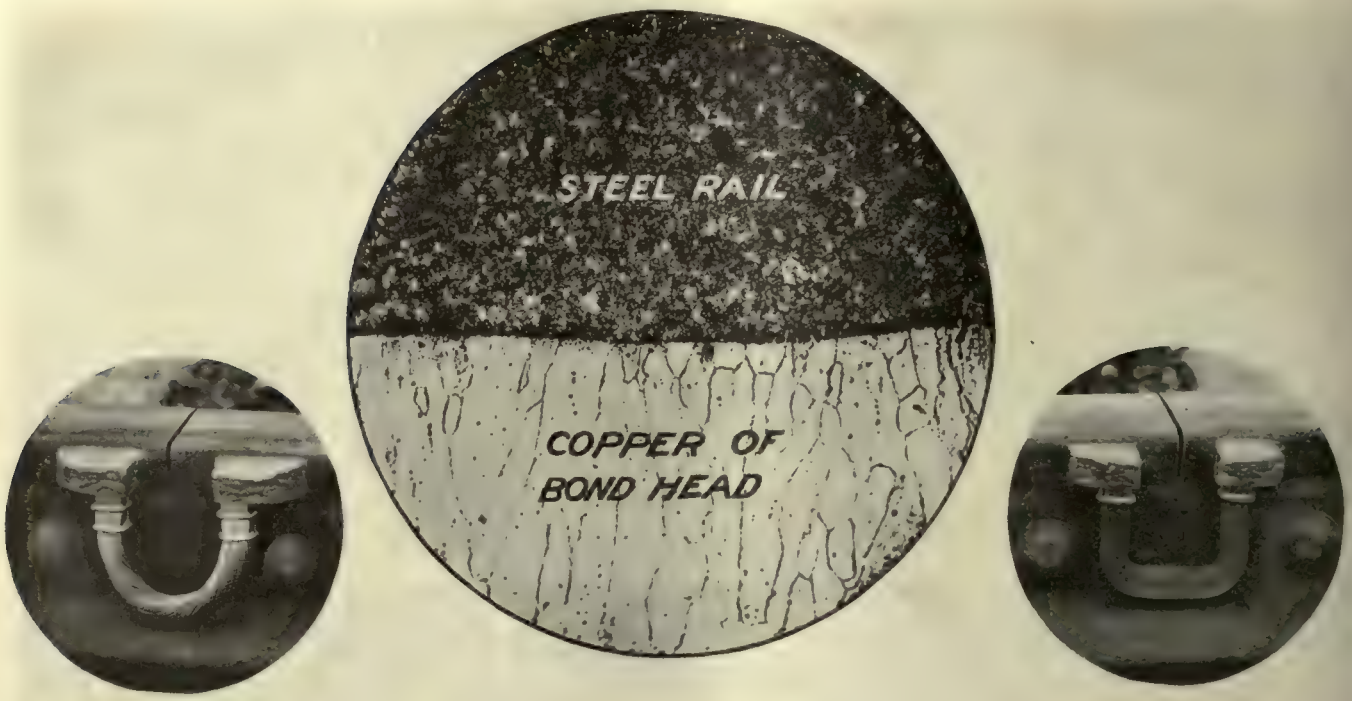
WHERE worn out track which has a concrete base under wood ties is to be rebuilt, Steel Twin Ties fit every case with a saving in first cost which has been as high as $26,928 per mile.

The conditions vary, of course, as to rail heights and clearances. For instance, in the case shown in the drawing, a clearance of 3½ inches was available; while in the job shown in the photograph the clearance was only 1¼ inches.

Before considering the removal of old concrete base let us prepare a suggestion and estimate for rehabilitation with Steel Twin Ties.

THE INTERNATIONAL STEEL TIE CO.
Cleveland, Ohio

Steel Twin Tie Track



The Copper to Steel Weld in UNA Bonding

The copper to steel weld in UNA Bonding is based on a well-established law of metallurgy. That is, when molten copper from which oxygen has been excluded is maintained in contact with clean steel until the latter is raised to the melting point of copper, an extremely strong, ductile weld results.

All of these fundamental principles are embodied in UNA Bonding in ways that make the welding simple and readily learned. For the heat, an electric arc is used. In order to retain the molten copper against the steel rail the bond is placed in a mold which surrounds the bond heads. Then UNA Metal (copper alloy) is melted into the mold and combined with the bond strands forming a permanent union of the strands to the head. Just as soon as enough UNA Metal has been added to fill the mold the bond head is completely welded to the rail—an operation requiring about 30 seconds for a 4/0 bond. Due to the action of UNA Metal it automatically cleans the rail of oxide and scale, leaving clean steel to which the copper welds. It is therefore unnecessary to grind the rails. UNA Metal also eliminates the gases formed during welding which leaves the finished bond head a solid homogeneous structure as shown by the above photo-micrograph. Actual tests have shown that the weld of copper to steel with UNA Metal is so strong that 25,000 to 32,000 lbs. steady force is required to shear a bond head from the rail—and then the shear takes place through the bond head leaving the weld of copper to steel intact.

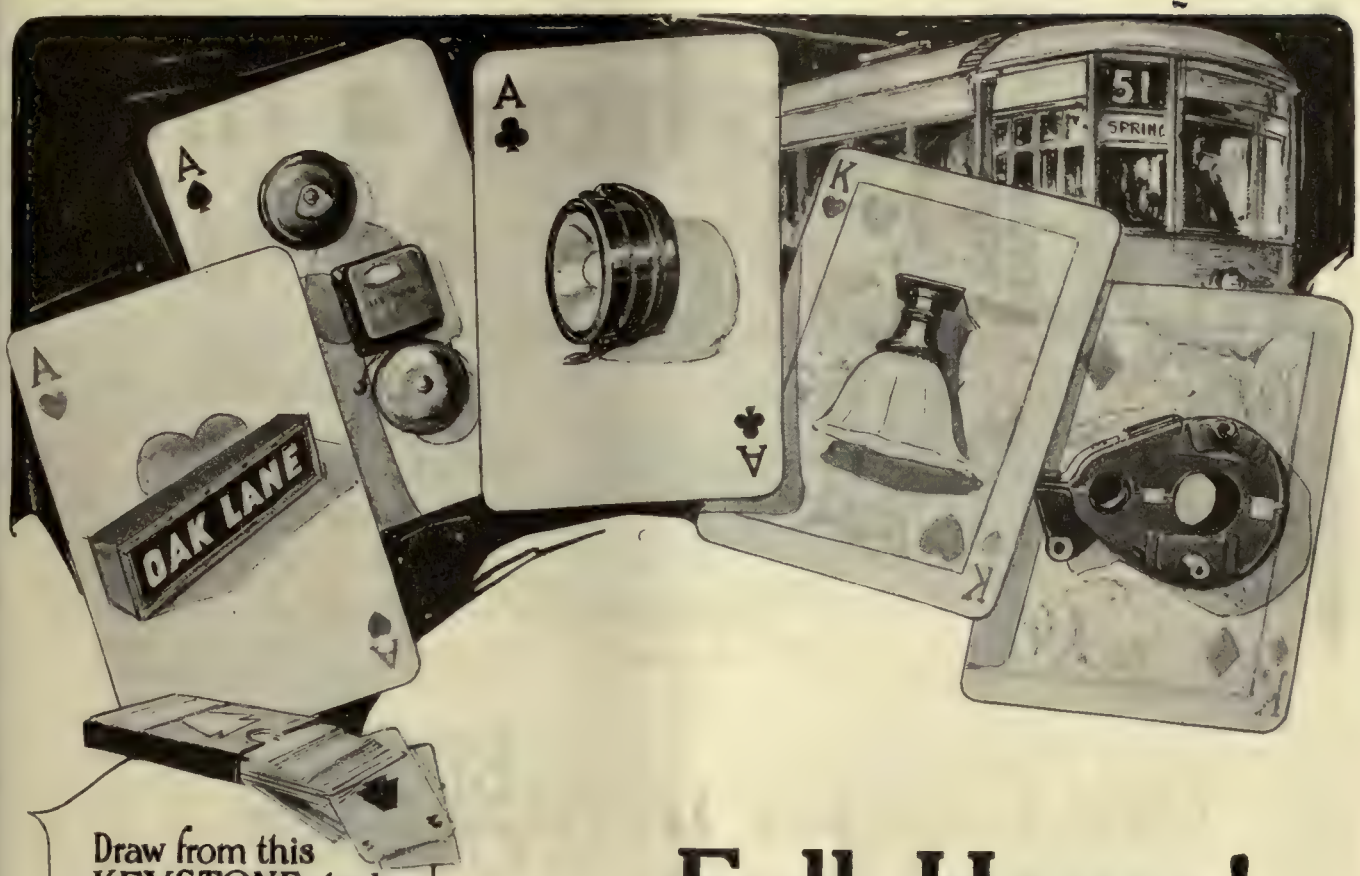
UNA Bonding is a most logical method of bonding because the all-copper bonds are welded direct to the steel rails. This provides a path of copper from rail to rail which makes the electrical conductivity a maximum. The actual welding of copper to steel with UNA Metal is simple and the operator has the advantage of being able to judge the weld he is making as he fills the mold.

These are some of the features which have made UNA Bonds approved by so many electric railways.

UNA Rail Bonds of standard capacities are available in both laminated and cable types. Let us send you a sample for your particular rail joint.

Rail Welding & Bonding Company

Cleveland, Ohio



Draw from this
KEYSTONE deck

Illuminated Destination Signs
Steel Gear Cases
Motormen's Seats
Faraday Car Signals
Lighting Fixtures
Golden Glow Headlights
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels

Full House!

Cars that win are like cards that win.

Cars *fully* fitted out with Keystone equipment bring home the money from increased passenger traffic. Their greater attractiveness, better service and increased reliability are revenue builders.

Look over the Keystone deck at the left and pick your own winners.

Comprehensive up-to-the-minute data sheets on any or all of these items will be sent gladly on request.



ELECTRIC SERVICE SUPPLIES Co.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

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BOSTON
88 Broad St.

Canadian Distributors:
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PROFITS—from a film of Paint



How much is the red store front worth to the United Cigar Stores or the white front to Child's Restaurants?

Paint has "trademarked" the service of these great institutions.

The service of electric railway companies can be "trademarked" in the same way.

BECKWITH CHANDLER CAR FINISHES SELL TRANSPORTATION

The Beckwith-Chandler Company makes finishes for brush or spray application—flat color and varnish systems, enamel systems and color varnish systems—for street railway car interiors and exteriors.

Bright finishes that stay bright
Durable finishes that are economical
Cooperation that gives real service

These things the Beckwith-Chandler Company offers to electric railways. We have a real interest and extensive experience in increasing riders through the use of paint. Let us help *you* to increase traffic. Ask *now* to be put in touch with electric railway men who know our products and our service, because they use them.



The Beckwith-Chandler Company
193-211 Emmett Street, Newark, N. J.
320 Fifth Avenue, New York, N. Y.



A straight line

is the shortest distance between two points. The installation of Galena Oils leads immediately to better operating conditions, through increased lubricating efficiency.

A checking-up of hot journals, hot armature bearings and hot axle bearings per 100,000 car-miles will determine the degree of improvement to your own satisfaction — a reliable comparison that will tell the story truthfully.

The reduction in expenses through the improved performance in these items alone will convince you of the actual economy of Galena lubrication, without even considering the better service it brings.

A complete line

of Galena lubricants covers every requirement of Electric Railway car or power house equipment. Each product is built specially to suit the type of equipment used.

Galena Oils are not ordinary refinery lubricants. They are made from selected stocks by our own special processes. Over a half century of experience in practical railway lubrication has contributed to their development.

Hundreds of electric properties are now using Galena Lubrication Service. Their uniformly efficient performance in mileage and low upkeep costs is conclusive evidence of its economic value.

Lubricating Efficiency



Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities





To Facilitate Bus Operation

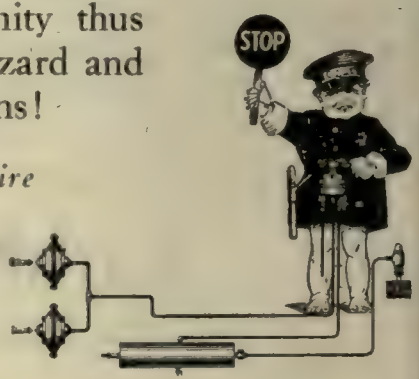
MANY traction companies are now operating Motor Buses in auxiliary service.

Buses equipped with Air Brakes appeal particularly to the Riding Public because they assure a degree of Safety that cannot otherwise be secured in the operation of motor vehicles.

Install Westinghouse Automotive Air Brakes and take advantage of the opportunity thus afforded to minimize the accident hazard and make your Buses pay maximum returns!

For further information, write or wire

Westinghouse Traction Brake Company
AUTOMOTIVE DIVISION
General Office and Works: Wilmerding, Pa.



WESTINGHOUSE
AUTOMOTIVE AIR BRAKES



Philadelphia's Record Breaking Car Order

This week there are being delivered the first of the 576 new cars recently ordered by the Philadelphia Rapid Transit Company.

In specifying the materials and equipment for this largest single order ever placed, unusual care was taken to choose wisely throughout.

The following advertising pages of this special insert show some of the equipment

Chosen on merit
for Philadelphia's latest record breaking car order

Alphaduct Co.; Anglo-American Varnish Co.; J. G. Brill Co.; Carnegie Steel Co.; Central Equipment Co.; Consolidated Car Heating Co.; Differential Steel Car Co.; Economy Electric Devices Co.; Electric Service Supplies Co.; General Electric Co.; John Lucas & Co.; National Brake Co.; National Pneumatic Co.; National Railway Appliance Co.; Ohio Brass Co.; Pantasote Co.; Safety Car Devices Co.; Star Brass Works; Tool Steel Gear & Pinion Co.; Turnstile Car Corp.; Universal Safety Tread Co.



576 Cars in one lot

In building Philadelphia's new cars, the "largest single order on record for electric railway rolling stock," the Brill Company feels that it has an important part in the great progressive movement now prevalent throughout the electric railway industry. It is significant that this unusally large order for cars, expressing Philadelphia's confidence in the future of the industry, should be placed when electric railways in general are showing activity in the purchase of new equipment.

All passenger cars are mounted on Brill 39-E-2 Single-Motor Trucks.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

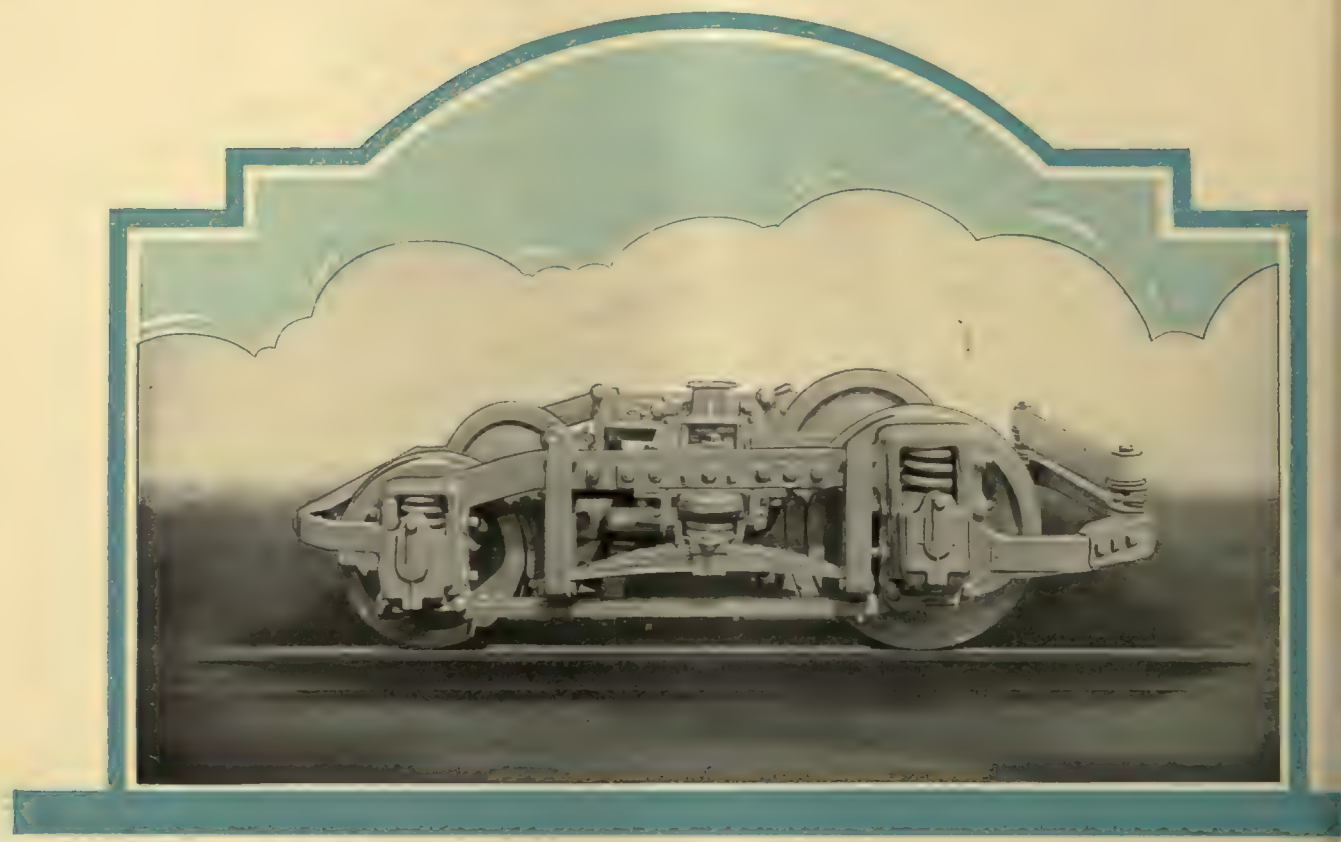
AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.



385 Single-End Passenger Cars
135 Double-End Passenger Cars
24 Shear Type Snow Plows
10 Double-Truck Snow Sweepers
6 Drop Side Work Cars
8 Side Dump Motor Cars
5 Side Dump Trail Cars
1 Surface Crane Car
1 Elev. and Subway Crane Car
1 Double-Truck Line Car

Total 576

BRILL



Brill Equipment
Specified

In addition to the car bodies and trucks, Philadelphia's "largest single order on record for electric railway rolling stock" specifies many Brill Specialties, the most important of which are listed on the opposite page.

The use of Brill 39-E Single-Motor Trucks can only be attributed to the satisfaction they have evidently given, as more trucks of this type are already in service in Philadelphia than in any other city in the world.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.





Brill Non-Reversible Seats

Standard equipment for single-end cars. Wall and aisle arms and plates, and pedestals are of pressed steel. Durability and simplicity of construction are characteristic of Brill Non-Reversible Seats.

Brill "Winner" Seats

Standard equipment for double-end cars. Double seat levers perfectly equalize reversing action of seat back, and with the comfortable pitch of cushions and backs are responsible for the popularity of Brill "Winner" Seats.



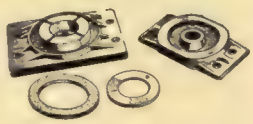


Brill 39-E2 Trucks

Standard equipment for all the passenger cars. Solid-forged Sideframes, Bolster Guide and Graduated Spring System are embodied in this single-motor type truck.

Brill Oil-Retaining Center Bearings

Standard equipment for all Brill pivotal trucks. As its name implies, it obtains constant lubrication, affording smooth and steady riding and lessening friction and rail wear at curves.





Brill "Half-ball" Brake Hangers

Standard equipment for all Brill single and double-trucks. Keeping brake shoes in proper alignment, thereby reducing maintenance, is but one of its principal functions.

Brill "Renitent" Posts

Embodied in construction of passenger cars, spring brass post casing holds sash under compression, keeping out water, air, and dust. Sash removable and interchangeable without aid of tools.





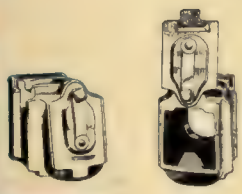
Brill "Dedenda" Gongs

Standard equipment for all types of cars. Gives a sharp, clear and unmistakable tone. One-half turn of pedestal will lock gong to prevent ringing on rear platform.

Brill Truck Springs

Manufactured in special department of high carbon, low phosphorus open-hearth steel, according to chemical specifications of American Society Testing Materials.



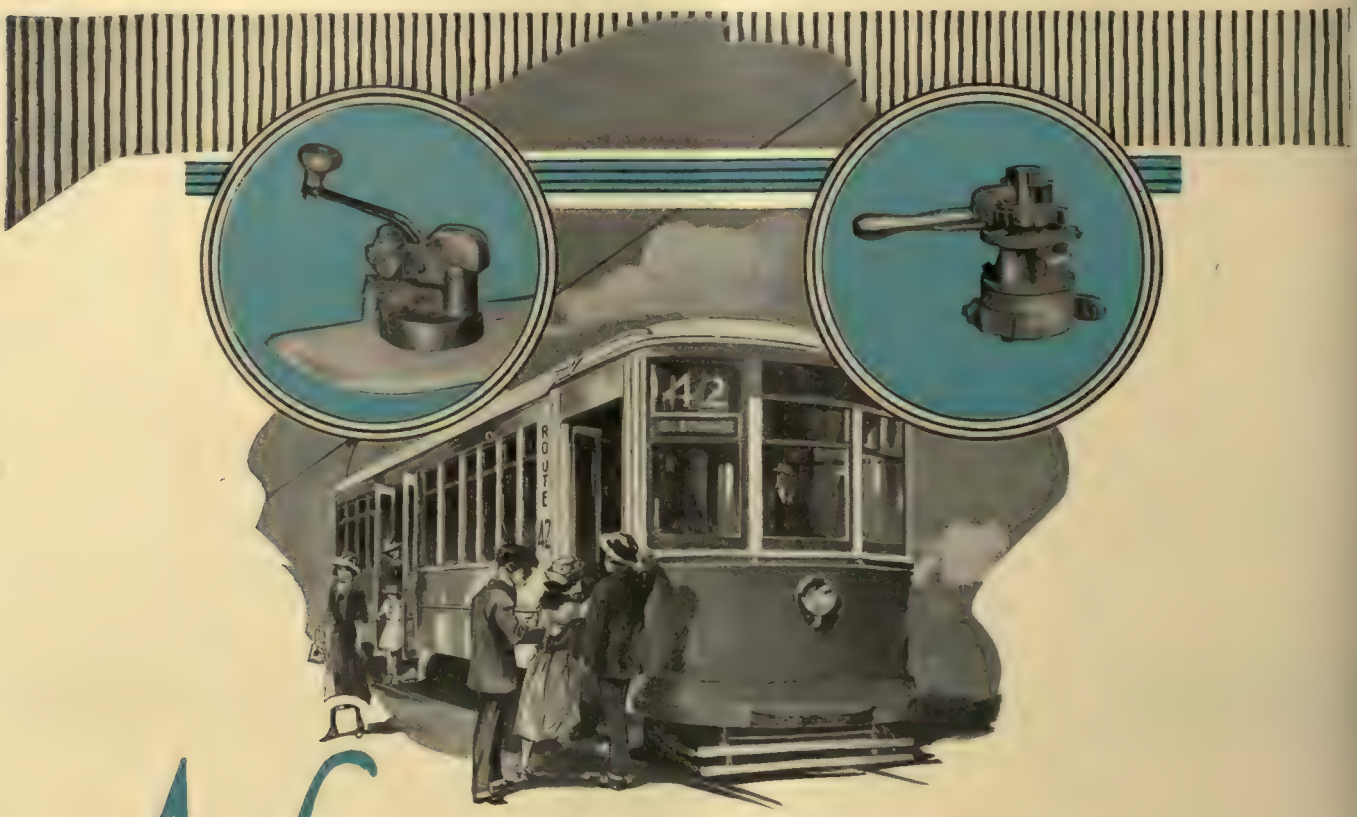


Brill Journal Boxes

All Brill Journal Boxes are carefully machined to give a tight fit for the pressed steel lid and a smooth close fit for the pedestals.

BRILL

CHOSEN ON MERIT FOR PHILADELPHIA'S



Naturally—we supply the Safety Car Devices!

OF the 576 cars included in the mammoth new car order of the Philadelphia Rapid Transit Company, 520 will be Safety Cars, equipped for one-man operation with the standard Air Brake and Safety Car Control Equipment of the Safety Car Devices Company—Naturally!

We originated the Control Equipment which made the Safety Car possible.

During the eight years since we "sat in" on the development of the first Safety Car, our equipment has been the determining factor in distinguishing Safety Cars from those of the ordinary two-man type.

Safety Cars in service with our equipment today number over 7,000 and are operating on more than 400 different properties.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

ATEST RECORD-BREAKING CAR ORDER



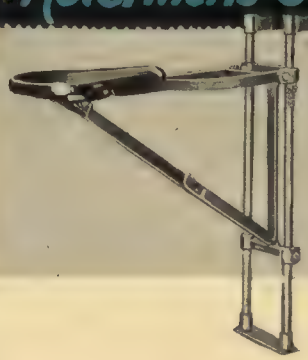
Keystone-Hunter Signs

International Registers



For Philadelphia's New Cars

Motormen's Seats



Quaker City Cars Speak for Themselves

By day or night, you can tell your car in Philadelphia because "it tells you." Keystone-Hunter Signs are standard here, so they've simply entered a repeat order—*a big one!*

Registers and motorman's seats supplied also, by the Keystone Service Station for electric railway companies.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA 17th and Cambria Streets
NEW YORK 50 Church Street
CHICAGO Monadnock Bldg.

Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors:
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

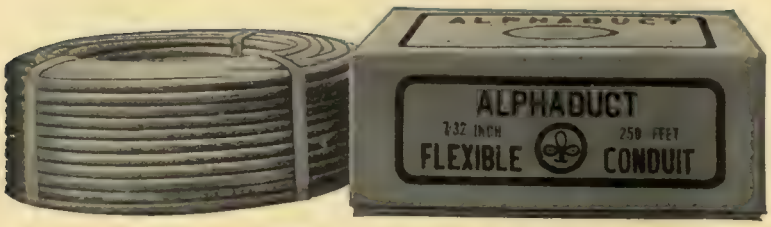
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CHOSEN ON MERIT FOR PHILADELPHIA'S

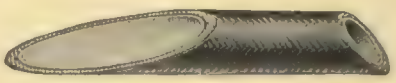
"ALPHADUCT"

Resists to a degree beyond that of any other flexible conduit the action of grease, oil, and moisture, and gives most complete protection to the insulation on the wire within it.

Minimum weight for adequate protection—
Twenty-one-year service record to back it—
Used by many prominent electric railways



Alphaduct offers the highest degree of protection under severest service conditions. Neither grease, oil nor moisture can penetrate the heavily glued duck inner lining. It can be cut lengthwise or crosswise and leave a clean, closed edge without ravellings or separations. See the picture and note how it's made. It will neither shrink nor stretch.



Made in 12 sizes from 7/32 to 2-1/4 inch diameters. Write to the factory for samples and data.



CONSTRUCTION:
Inner lining of Canvas. Glue sized and SOAP-STONED.

Water-proof Coating.

Hard Fibre Cord.

All interstices filled with special waterproof compound.

Outer Jacket.

Fire resisting Outer Coating.

FINISHED CONDUIT.

Examined and labeled under the direction of the Underwriters Laboratories.

ALPHADUCT COMPANY

136 Cator Ave.
Jersey City, New Jersey

ATEST RECORD-BREAKING CAR ORDER





Imperial Headlight

fitting fittings

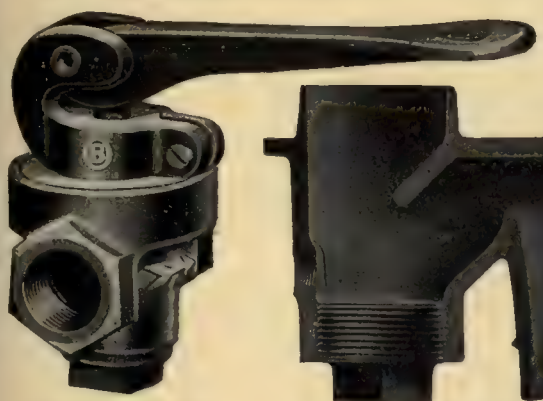


O-B Trolley Catcher

O-B marks on car equipment are significant of refinement in construction and perfection in functioning.

When any Company orders entire equipment of one manufacturer for such an imposing array of rolling stock as P. R. T. has just put through, is it not a positive indication that previous experience has convinced them of its superiority?

O-B Diaphragm Sander Valves and Sand Traps, O-B Trolley Catchers and Crouse-Hinds Imperial Headlights already have proved their worth on Philadelphia's earlier cars. O-B Equipment on all these additional cars is consistent.



O-B Sander Valve

O-B Sand Trap

The Ohio B Brass Co.

Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

PRT

CHOSEN ON MERIT FOR PHILADELPHIA'S

March 10, 1923 ELECTRIC RAILWAY JOURNAL

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Details of Philadelphia Order for 576 Cars

On Jan[illegible]22 the board of directors of the Philadelphia Rapid Transit Company authorized the lease and purchase by car trust agreement of 576 [illegible]w cars of which 520 will be passen[illegible]cars. A brief note in regard to [illegible]der, which is said to be the [illegible]ingle order for trolley cars [illegible]in this country, was made [illegible]issue of the ELECTRIC [illegible]tails regarding [illegible]nt are now [illegible]d eighty-[illegible]te-

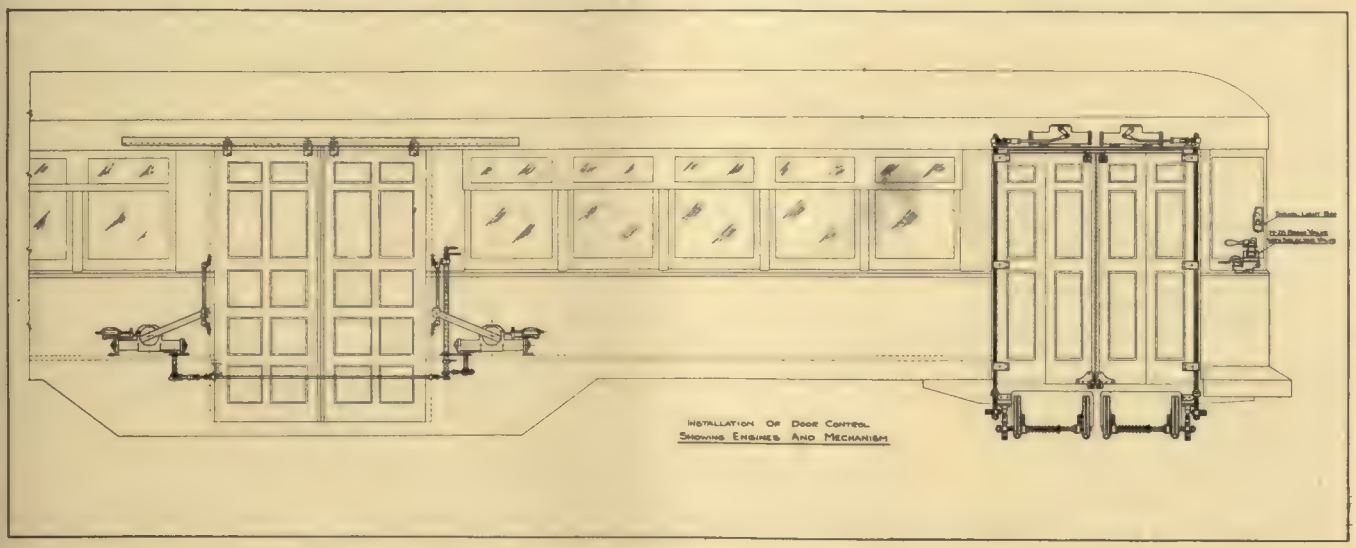
MANUFACTURERS OF EQUIPMENT, TOGETHER WITH TYPE FURNISHED

Air brakes .....G.E. Co.
Armature bearings .....Plain
Axles.....Carnegie Steel Co.'s heat treated
Bumpers.....Six-inch Channel reinforced
Car signal system..Brill's standard and push button contact bases—Faraday Type-E
Car trimmings .....
...Malleable and bronze statuary finish
Center and side bearings...Brill's standard
Conduits and junction boxes....Galvanized
Control G.E. 2-K-68 with ratchet attachment
Couplers .....Drawbar pockets
Curtain fixtures..Curtain Supply Co.'s No. 88
Curtain material....Double face pantasote
Destination signs .....Hunter
[illegible] operating mechanism .....
.....National Pneumatic Co.
Wheelguards .....H. B. Life Guard
Gears and pinions .....
.....Tool Steel Gear & Pinion Co.
[illegible]kes .....Peacock staffless
Heater equipment .....
.....Consolidated Car Heating Co.'s
Headlights..Crouse Hinds semi-[illegible]ore lens
[illegible] bearings .....Plain
.....Plain cast-iron
.....M. [illegible]

1040
"Tool Steel" gears
+pinions
go on this new equipment.

A quality specification.

ATEST RECORD-BREAKING CAR ORDER



Philadelphia Did It

Did what?

Installed full National Pneumatic Line consisting of Door Engines, Door and Step Operating Mechanism with Interlocking Safety Door Control and Motorman's Signal Light System, thereby obtaining the maximum Safety, Speed and Efficiency in the service which will be rendered by this unusually large number of new cars.

National Pneumatic Co.

Originators and Manufacturers

Door and Step Control — Door and Step Operating Mechanisms
Motorman's Signal Lights — Safety Interlocking Door Control
Multiple Unit Door Control

Principal Office: 50 Church St., New York

Philadelphia—Colonial Trust Bldg. Chicago—McCormick Building
Works—Rahway, New Jersey

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

CHOSEN ON MERIT FOR PHILADELPHIA'S





Light
Strong
Sanitary
Comfortable
Economical

when they have to stand—
Philadelphia riders will have

something more than loose dangling grimy leather straps. Mitten management, recognizing that peak loads require some standees, equipped all these new passenger cars with

BUFFALO LIGHT METAL HANDLES

Twenty thousand all at once is a big order. Only the confidence and satisfaction engendered by previous experience with Buffalo Light Metal Handles could have induced the Philadelphia Rapid Transit Company to come back for another quota of this magnitude.

Central Equipment Company
Exclusive Manufacturers
Englewood Avenue, Buffalo, N. Y.

Representatives:
National Railway Appliance Co., New York
Grayson Railway Supply, St. Louis Hageman-Castle Corp., Chicago

LATEST RECORD-BREAKING CAR ORDER



2640 ECONOMY METERS in Philadelphia

EARLY this year the Philadelphia Rapid Transit system placed an order for Economy Meters, with car inspection dials, to completely equip the forth coming new P.R.T. Cars.

Philadelphia began equipping with Economy meters in 1919. Subsequently they ordered 310 meters to completely equip the Callowhill division.

After 18 months power-saving and car inspection service with 310 cars the P.R.T. ordered Economy Meters to completely equip all its street cars.

This system now has 2640 Economy Meters in service.

METER The Energy—that's what you want to save

ECONOMY ELECTRIC DEVICES COMPANY
1592 Old Colony Building, Chicago, Ill.

Domestic Representatives:

National Railway Appliance Co., New York
L.A. Nott, San Francisco
Burton R. Stare Co., Seattle
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis
Detroit Railway Supply Co., Detroit

Foreign Representatives:

Appareils Electriques et Scientifiques, Rue Royal, 166, Brussels, Belgium
Ashida Engineering Co., Daini Sagisucho, Oasaka, Japan
Carrick Wedderspoon & Co., 94a Hereford St., Christchurch, New Zealand
Alfred Collyer, 183 George St., Toronto, Canada. 83 Craig St., Montreal
Albert Delamare, Director, 15 Allee Andrea 15, Bonely, Seine, France
Edison Swan Electric Co., Ponders End, Middlesex, England
Griffin Engineering Co., 94 Main St., Johannesburg, South Africa
Compania Nacional de Electricidad, Barcelona, Spain. Madrid, Spain.
H. I. Skilton, 519 National Bank Bldg. Havana, Cuba
Technisch Bureau, Hellendoorn, Javastraat 25, The Hague, Holland
Franki Warburton, Ltd., 380 Bourke St., Melbourne. 307 Kent St., Sydney

PRT

CHOSEN ON MERIT FOR PHILADELPHIA'S

"THE NATIONAL LINE"

Items in blue supplied for Philadelphia's New Cars

Tool Steel Gear & Pinion Co.
.....Gear and Pinions.....
C-H Electric Heaters
Fort Pitt Spring & Mfg. Co.
Economy Electric Devices Company
Power Saving & Inspection Meters
Lind Aluminum Field Coils
Anderson Slack Adjusters
Garland Ventilator Co.
.....Ventilators .....
Drew Line Material and Railway Specialties
Dunham Hopper Door Devices
Central Equipment Co.
.National Hand Holds.
Pittsburgh Forge & Iron Co.'s Products
Flaxlinum Insulation
Turnstile Car Corporation
..... Turnstiles .....
E. Z. Car Control Corporation, Safety Devices
Genesco Paint Oils
Feasible Drop Brake Staffs
Anglo-American Varnish Co.
Varnishes, Enamels, etc.
.....Headlining Enamel.....
National Safety Car Equipment Co.

B. A. Hegeman, Jr., President — Charles C. Castle, First Vice-Pres
Harold A. Hegeman, Vice-President and Treasurer — W. C. Lincoln, Manager Sales and Enginee

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor., 45th St., N. Y.

BRANCH OFFICES

Munsey Bldg., Washington, D. C.; 100 Boylston St., Boston, Mass.; Hegeman-Castle Corporation, Railway Exchange Bldg., Chicago, Ill.

LATEST RECORD-BREAKING CAR ORDER

A. A.
"ILLUMINITE" HEAD LINING FINISH

Specified for Philadelphia's New Cars

Made by
THE ANGLO-AMERICAN VARNISH CO.
Newark, New Jersey

Manufacturers of
A-A Railway Surfacer Systems
A-A Young American Enamel System
A-A Castilian System
A-A Railway Target and Semaphore Enamels
A-A Shop Cleaner

General Agents: National Railway Appliance Co., 452 Lexington Ave., New York

AGASOTE
TRADE MARK
PANTASOTE
TRADE MARK



In
Philadelphia
as everywhere

Standard for
Electric Railways

THE PANTASOTE COMPANY

11 Broadway, New York
Peoples Gas Building, Chicago
Monadnock Building, San Francisco

Kalamazoo
trolley wheels and harps







From the largest manufacturer for the largest car order.

Trolley wheels for Philadelphia's 576 new cars will come from the World's largest exclusive manufacturer of this type of equipment.

This specification by the P. R. T. is only another of the many striking endorsements of Kalamazoo Trolley Wheels, furnished by orders and repeat orders from large and prominent electric railway companies all over the country.

For more than 25 years, Kalamazoo Trolley Wheels and Harps have been building, steadily, their now well-established reputation for satisfactory and economical service.

STAR BRASS WORKS
Kalamazoo, Michigan
The largest exclusive manufacturers of trolley wheels in the world

CHOSEN ON MERIT FOR PHILADELPHIA'S

Mitten Management means considerate treatment of public

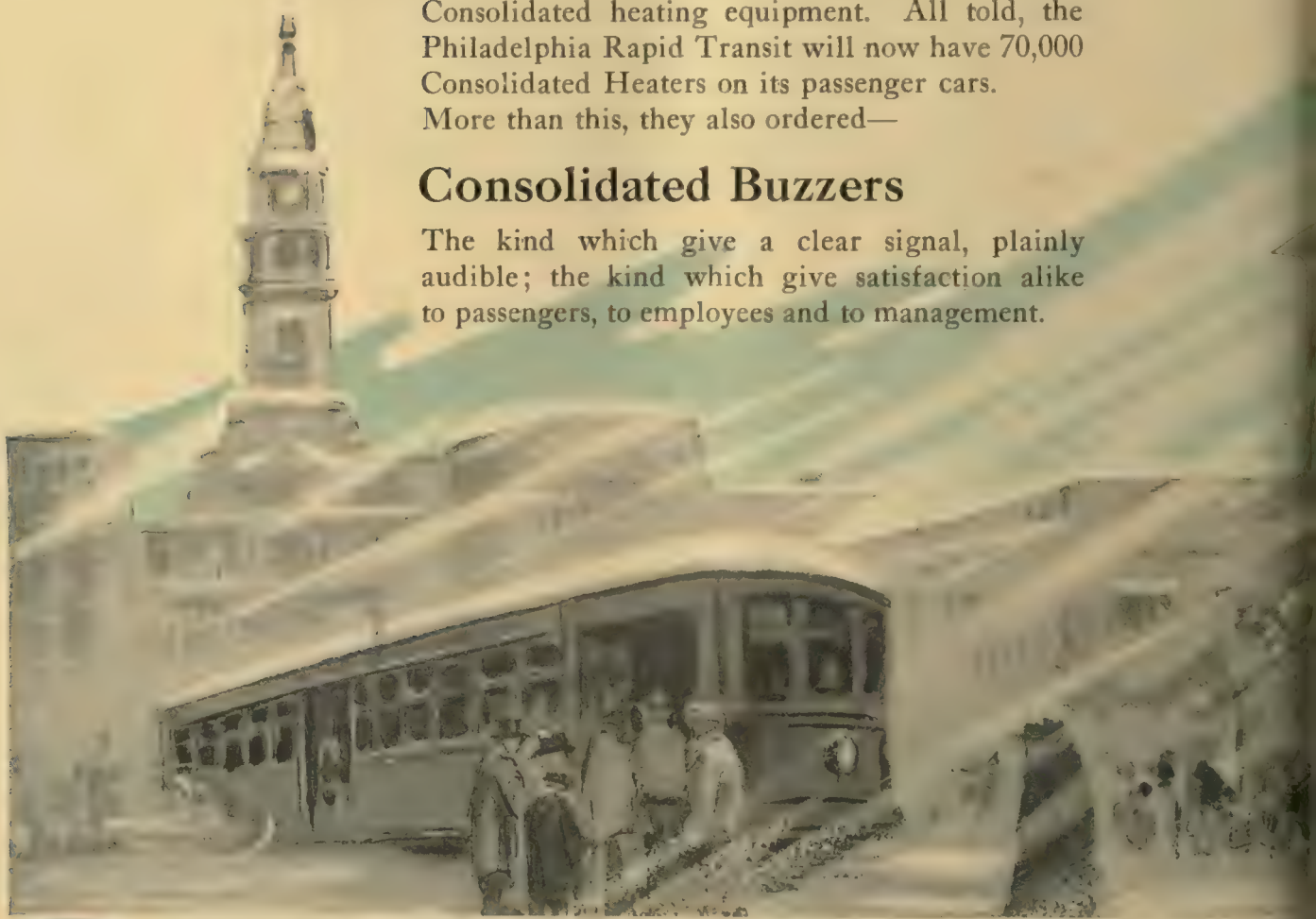
Not only co-operation with employees, but a real "public-be-pleased" spirit characterizes all the policies of this Philadelphia organization. They are keenly alive to the fact that warm cars in Winter are a source of satisfaction to the public. So for these new passenger cars they chose—

Consolidated Heaters

This only repeats their previous preference for Consolidated heating equipment. All told, the Philadelphia Rapid Transit will now have 70,000 Consolidated Heaters on its passenger cars.
More than this, they also ordered—

Consolidated Buzzers

The kind which give a clear signal, plainly audible; the kind which give satisfaction alike to passengers, to employees and to management.



PRT

LATEST RECORD-BREAKING CAR ORDER



CONSOLIDATED
CAR-HEATING CO.

New York Albany, N. Y. Chicago

CONSOLIDATED CAR HEATING COMPANY

PRT

CHOSEN ON MERIT FOR PHILADELPHIA



13

DIFFERENTIAL CARS for Philadelphia

Philadelphia's eight Differential Motor Cars and five Differential Trail Cars are to be used principally on track, work, coal hauling and disposal of ash and waste material.

Records already established by Differential Cars on many other roads throughout the country, are too well secured to permit any doubt as to their future efficiency and economy. Philadelphia's engineers investigated these records before placing this order.

Any investigation of this kind will invariably compel the purchase of Differentials. No car order is complete unless it includes Differential Cars.

THE DIFFERENTIAL STEEL CAR COMPANY, Findlay, Ohio



ATEST RECORD-BREAKING CAR ORDER

A STRIKING TESTIMONIAL

Of Confidence in the Quality of

Lucas
Paints and Varnishes
Purposely Made for Every Purpose

Which were specified and used exclusively, as outlined below, to beautify and protect the $6,500,000 investment represented by this record-breaking car order.

ROOF
Lucas Railway Roof Paint (3 coats)

EXTERIOR
Lucas Elastic Metal Primer (1 coat)
Lucas Elastic Glazing Putty
Lucas Car Body Surfacer (3 coats)
Lucas Car Body Sealer (1 coat)
Lucas Car Body Color No. 1 (2 coats)
Lucas Car Body Color No. 2 (1 coat)
Lucas Elastic Railway Finishing Varnish (2 coats)

INTERIOR
Lucas Railway Interior Finishing Varnish (4 coats)

SEATS
Lucas Hard Drying Seat Varnish (4 coats)

FLOOR
Lucas Railway Floor Paint (3 coats)

UNDER FRAME
Lucas Elastic Metal Primer
Lucas Metalife Black

TRUCKS
Lucas Railway Truck Black



The *Lucas* System of Car Finishing is sufficiently elastic to comply with varying specifications as to number of coats without jeopardizing the service expected—

John Lucas & Co., Inc.

Paint and Varnish Makers since 1849

PHILADELPHIA

New York **Chicago** **Boston**
Pittsburgh **Oakland**
Asheville Atlanta Denver Fresno Houston Jacksonville
Los Angeles Memphis Savannah

CHOSEN ON MERIT FOR PHILADELPHIA'S



They enter here →

Unimpeded passenger flow on Philadelphia's 106 new cars equipped with the

SYRACUSE CAR TURNSTILE

→ *They leave here!*

Operation by one man will not result in crowding passengers in and out of one end on these cars.

Philadelphia's engineers realized the need of overcoming this objection to one-man service. So they investigated all available schemes for meeting this difficulty. Favorably impressed with the successful results of our car turnstile in Syracuse and elsewhere, they ordered them for 106 of their own cars.

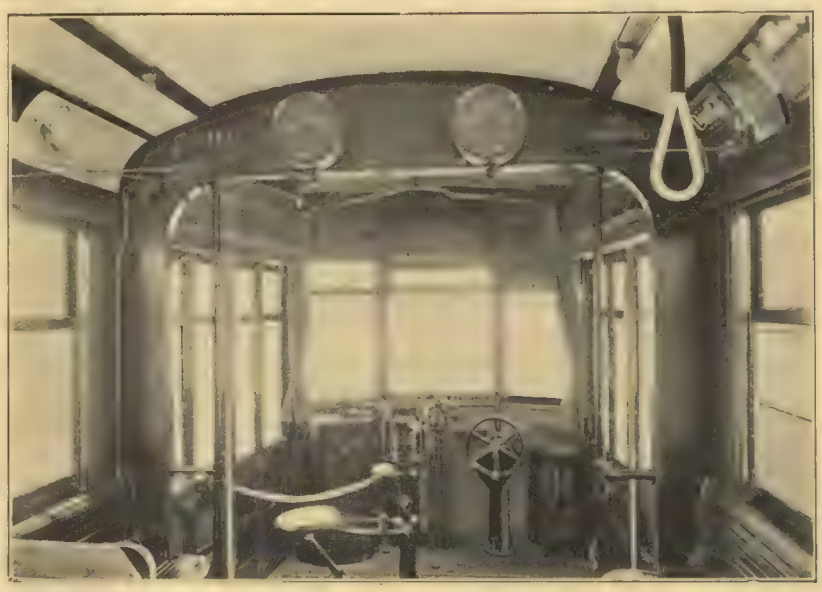
The Syracuse Car Turnstile takes the place of a conductor. It permits one-way flow only, so that the center door can be used for exit alone while passengers enter by the front door, paying fares as they pass the operator. This makes one-man operation possible on the largest double-truck cars. It increases earnings per platform employee, per car mile and per car hour. One man handles more passengers with less delay.

THE TURNSTILE CAR CORPORATION
340 West Fayette St., Syracuse, N. Y.
W. M. Lawyer, Gen. Sales Manager

LATEST RECORD-BREAKING CAR ORDER

Peacock Staffless Brakes

For Philadelphia's New Cars





A compliment that counts!

Something more than chance was involved when the Philadelphia management went out of its way to demand Peacock Staffless Brakes on the largest car order ever placed.

Their decision was a compliment to the qualities of the Peacock Staffless, qualities demonstrated by test and by actual experience. These qualities are primarily,—(1) reliability, (2) braking power, (3) chain winding capacity, (4) light weight, (5) small space occupied, (6) low maintenance.

An established standard for this road

Philadelphia motormen know something about Peacock Staffless Brakes. They are standard equipment on Quaker City cars. With the completion of this last order, the Philadelphia Rapid Transit Company will have a total of 2,764 Peacock Staffless Brakes.

National Brake Co., Inc.

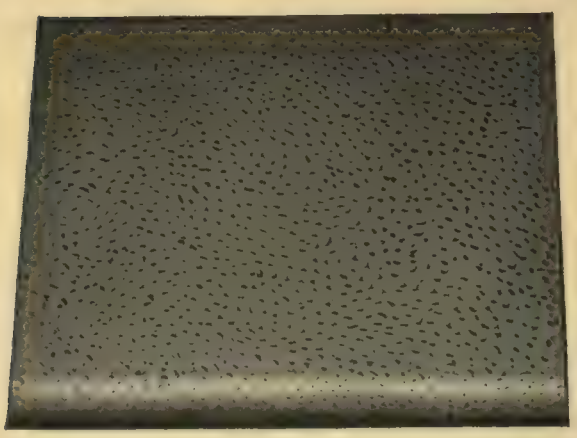
890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative,
Lyman Tube & Supply Co., Ltd., Montreal

PRT

CHOSEN ON MERIT FOR PHILADELPHIA'S





UNIVERSAL SAFETY TREADS

used to safeguard footing

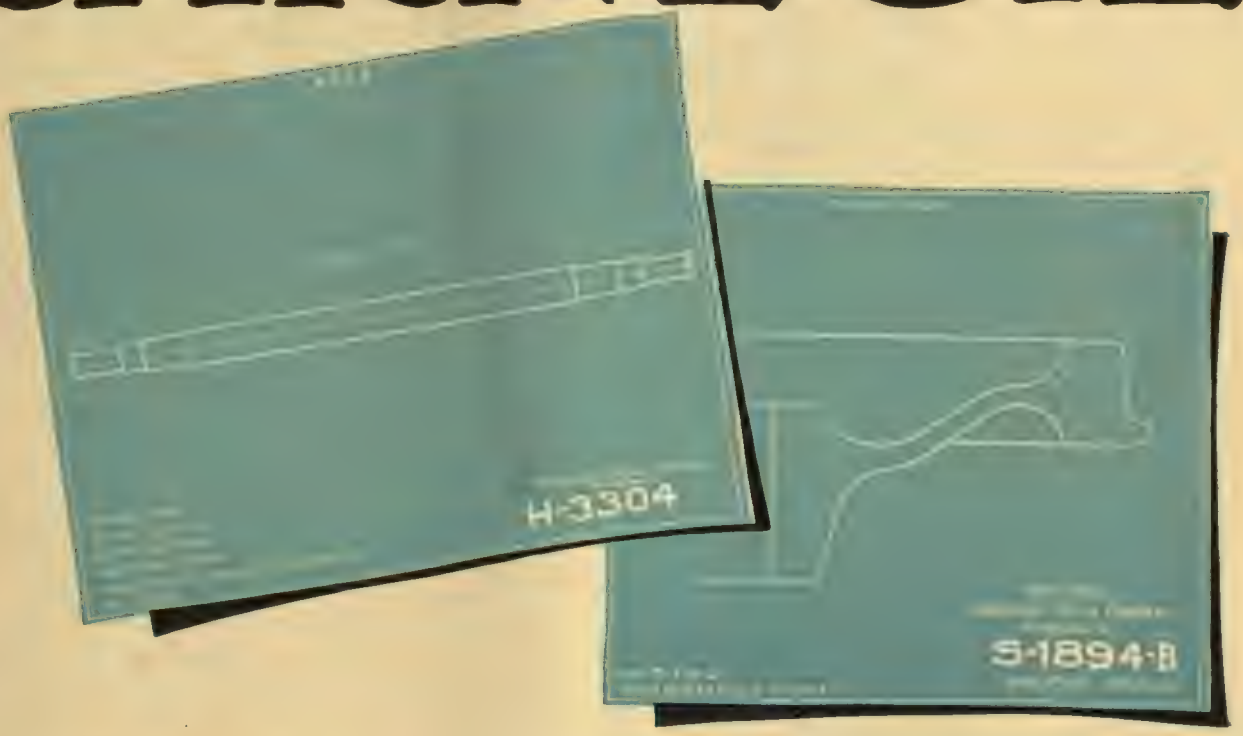
Philadelphia has already had experience with Universal Anti-Slip Metal Treads—that satisfactory kind of experience which leads to "repeat" orders, even on such large-scale equipment additions as this. The safety value, the service value, and the economy value of Universal Treads are well-established on the Philadelphia Rapid Transit, as on many other large American railway systems.

Universal Treads in various styles, adapted to every purpose, are being extensively used.

UNIVERSAL SAFETY TREAD CO.
40 Court Street
BOSTON, MASS.

LATEST RECORD-BREAKING CAR ORDER

CARNEGIE





Philadelphia calls for

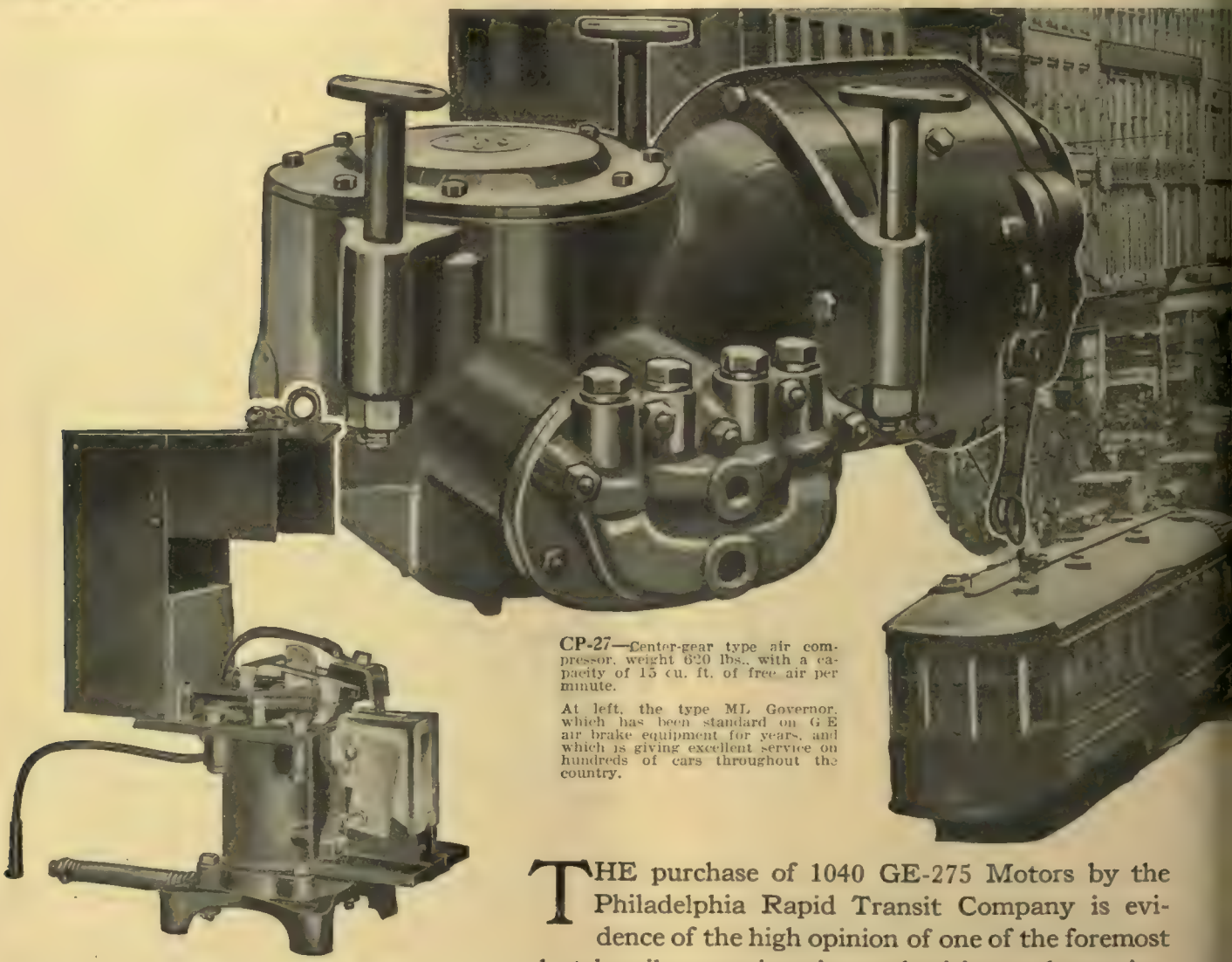
CARNEGIE
Wrought Steel
WHEELS
and Heat Treated Axles

Carnegie Steel Company
GENERAL OFFICES: PITTSBURGH, PA.

WHEELS and AXLES

PRT

CHOSEN ON MERIT FOR PHILADELPHIA'S



CP-27—Center-gear type air compressor, weight 620 lbs., with a capacity of 15 cu. ft. of free air per minute.

At left, the type ML Governor, which has been standard on G E air brake equipment for years, and which is giving excellent service on hundreds of cars throughout the country.

THE purchase of 1040 GE-275 Motors by the Philadelphia Rapid Transit Company is evidence of the high opinion of one of the foremost electric railway engineering authorities on the serviceability of this motor.

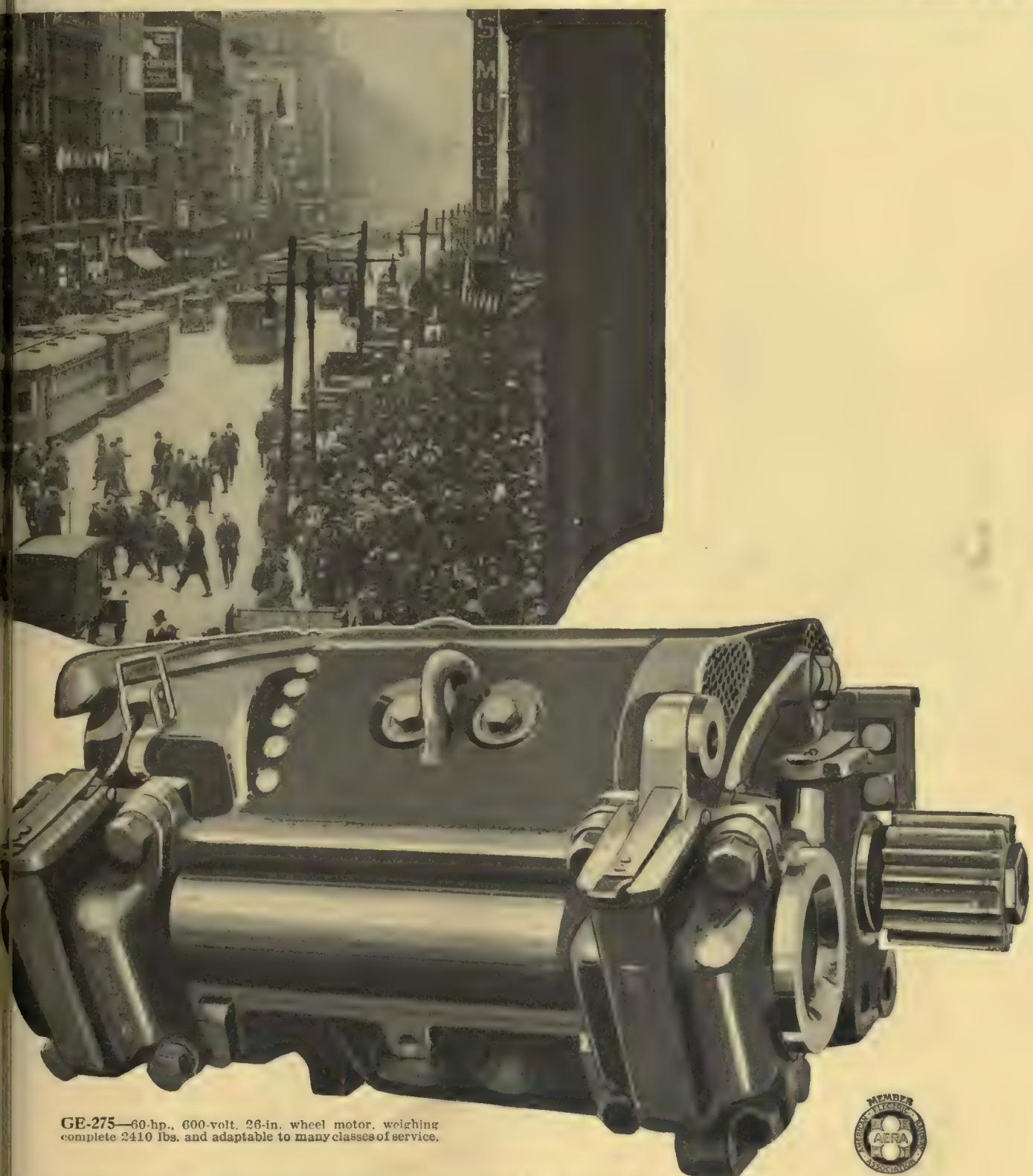
Similarly, the selection of the CP-27 Compressor for 520 new cars emphasizes the excellent operating record of more than 2500 CP-27 Compressors in use on the Philadelphia Rapid Transit System. In fact, low maintenance costs for the CP center-gear type Air Compressor have resulted in recent repeat orders for nearly 1000 equipments from other roads all over the country.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

No consideration other than merit could justify such confidence in car equipment as is manifested in the placing of this large order with the General Electric Company. Turn to the back cover of this issue of Electric Railway Journal for a further expression of confidence in the GE-275 Motor, CP Compressors and K Control.

GENERAL

ATEST RECORD-BREAKING CAR ORDER



GE-275—60-hp., 600-volt, 26-in. wheel motor, weighing complete 2410 lbs. and adaptable to many classes of service.

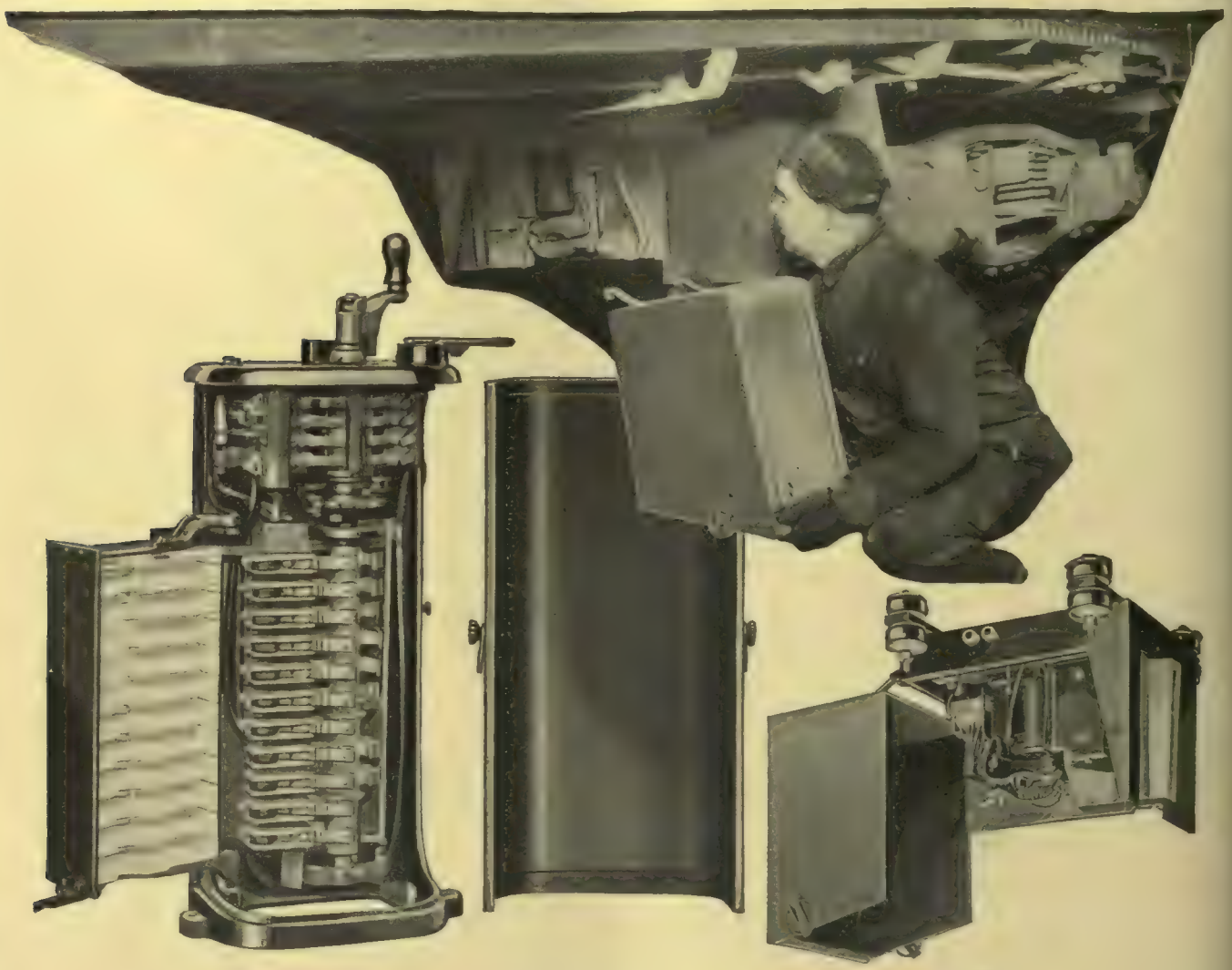
MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

ELECTRIC

25-212

PRT

CHOSEN ON MERIT FOR PHILADELPHIA



—and K-Control with Line Breakers

The G-E Line Breaker on each of Philadelphia's new cars will keep controller maintenance costs down to a minimum. G-E Sales Offices—in all principal cities—will explain to you in detail the advantages of Line Breaker Equipment.

The success with which "K" Control and G-E Line Breaker Equipment have operated on the more than 1500 surface cars of the Philadelphia Rapid Transit Company was the deciding factor in the selection of K type Controllers with Line Breakers for its 520 new cars.

The Line Breaker, which is installed under the car, removes the arcing nuisance from the platform. It has proved of great benefit also in protecting motors from improper acceleration, and in reducing arcing and consequent wear on the controller fingers and segments.

Another desirable feature of the Line Breaker is that it permits the interlocking of doors through the control circuit.

GENERAL ELECTRIC

40-288

New York, Saturday, June 30, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61
Number 26

Re-Equipping to Save Money

RECENTLY a story appeared in this paper which gave the engineering, operating and economic considerations involved in the decision to scrap the fifteen-year old a.c. cars of the Indianapolis & Cincinnati Traction Company and re-equip the property with modern d.c. motored cars and automatic substations. This was all in preparation for extending the line 75 miles on through to Cincinnati. But if this extension should never be made, the change to modern equipment will result in a saving in operating expenses equal to 14 per cent return on the additional investment on the basis that no more business is done than in 1922. The re-equipment of the present property is therefore a good paying proposition even without the further advantages that will accrue to the road, such as the ability to give much more reliable service in new, attractive, better riding cars, which will bring more patronage.

Of course few railways have the opportunity to make so radical a change as was made on the I. & C. from a.c. to d.c. operation, in a case where the a.c. installation was a misfit, but there is nevertheless a sufficient inducement to make careful consideration of re-equipment important. To replace d.c. motors and cars twenty years old, and more, with modern cars of lighter weight and with more efficient motors will produce savings estimated to run from 8 to 12 per cent on the additional investment. In city service, if the saving resulting from more car-miles per car-hour is included, this will run the return up to 15 to 20 per cent. Adding to these savings the merchandising value of new cars makes re-equipment quite worth while.

Making Secure the Investment in the I. & C.

THE Indianapolis & Cincinnati Traction Company was one of those interurban lines whose continued financial success was a matter of doubt. It operates out of one good terminal city into farming communities, and hence must depend almost entirely on local patronage, as it does not run to any other commercial center. In view of the increasing use of the private automobile and the competition of motor buses, this local travel has diminished so that it has recently been scarcely adequate to support the railway even to the extent of paying operating expenses and fixed charges.

The re-equipment of the present property alone would enable the railway to carry on somewhat longer, but would not make its financial position secure. The completion of the plan of the company, however, to go forward promptly with the extension of the line to connect Indianapolis with Cincinnati, will place the property in an altogether more favorable position as to earning capacity per mile of line. That will add to the present limited local business the commercial travel that is attracted readily to frequent, high-speed, comfortable transportation between two important cities. Such transportation, if the cities are 50 to 100 miles apart, is in no serious danger from automobile and bus competition.

Thus it may be said that it is much more than an ambition with Charles L. Henry, president, to push through to completion the original idea behind the incorporation as indicated by the company name.

Under-Insurance Is a Common Fault

MUCH has been published on the method of determining valuations of railway physical property for rate-making purposes, but little on the method and need of making valuations of this same kind of property for fire insurance purposes. Nevertheless, neglect of this matter will nearly always result in serious consequences, if the property is of much value and should happen to be destroyed by fire.

The value of a building for fire insurance purposes is not the same usually as that at which it is carried in the balance sheet as an asset. It may also be quite different from the value at which it is held in a rate case or for taxation purposes. But it can be very definitely defined. It is the sum at which in each year the building can be replaced or another building as good for the purpose may be erected. This means, of course, that its value for fire insurance purposes varies from year to year with fluctuations in the cost of building construction.

Conservative railway financial managements often take pride in the large amounts which they charge off yearly for depreciation of their physical property. For the stockholder this policy has many points of merit when this policy is applied to the balance sheet, but the experience of the last few years shows that it may be and probably is absolutely wrong if applied to the amounts at which this same property is insured. Thus if a carhouse was built ten years ago for $200,000, its cost of replacement today might be double that sum, while if a system of charging off 3 per cent a year on the original cost for depreciation was followed it would be represented in the balance sheet at only $140,000. Here is a difference of $260,000 which the company would lose if the building was destroyed by fire. Obviously the same principle applies to other parts of the equipment.

It is somewhat strange that on a great many properties the work of handling fire insurance seems to be conducted on a different basis than are other parts of the business. For these, the advice of experts within or without the organization is sought. But the business of caring for the fire insurance is often turned over to a clerk, and the policies are taken out through a

local agent for no other reason than that he happens to be a friend of one of the officials of the company. This is all right if he earns his premiums, but to do so he ought to make sure that the company's risks are fully covered and that it is taking advantage of all practicable opportunities to reduce its rates by the introduction of fire preventive measures.

Utility insurance is quite a special study in many respects, which points to the value of placing insurance matters in the hands of some one like a general agent who is particularly equipped and experienced in this class of work. When dependence is placed solely in the average local agent, the railway company may easily be subject to great losses or to unnecessary high rates through lack of competent advice in securing adequate protection and in pursuing ways and means to reduce the risk and the cost.

Would Use Even a Tragic Accident for Political Capital

MAKING political capital of a tragic accident would seem to be about the lowest form of human enterprise. Yet that is about what New York's Mayor did on the occasion of the disaster on the Brooklyn-Manhattan elevated line in the heart of Brooklyn last Monday when two cars fell off the structure, killing eight and injuring eighty. After a cursory glance at the splintered timbers where the cars left the structure, he promptly announced that rotten guard timbers were responsible for the accident. By contrast, engineers and other experts long trained in the science of construction and railroad operation have withheld their judgment pending the disclosures of thorough investigation.

The Mayor declared he would write the Governor demanding the removal of the Transit Commission, his favorite victim of attack, as this condition existed with its knowledge and consent. He indicated also that the accident would probably never have occurred if his traction program had not been killed at the recent legislative session. Fortunately, all of the local newspapers have severely criticised his attitude.

So far as can be ascertained to date, it appears that whatever the condition of the guard timbers was, they performed their function, as the truck which was derailed was kept on the structure. If the sudden lurch of the car body, resulting from the truck suddenly turning crosswise of the track, was responsible for breaking the king-bolt and throwing the body off the track, then no structure short of a high wall would have saved the cars from falling to the street. The traction company is co-operating in a thorough study of the causes, for, naturally, it is most vitally interested in bringing out any facts that can be used in devising ways to prevent a recurrence of an accident which will probably cost the railway a million dollars or more.

Principles of Utility Regulation Are Restated in Illinois Case

IN A CLEAR-CUT decision in the case of the West Suburban Transportation Company, appellant, vs. the Chicago & West Towns Railway Company, appellee, the Supreme Court of Illinois has defined the purposes of a public utilities commission and has declared its willingness to intervene in cases where these purposes are not carried out. Of course, there is nothing absolutely new in principle in what the court says in this case. The whole idea of public utility regulation in this country is built around the theory that a utility whose rates and service are regulated will be protected against competition to the extent that a new company will not be permitted to supply a similar service in the same territory unless that service is a matter of convenience and necessity to the public. Neither is it entirely without precedent that the courts should intervene even in matters of judgment on the part of the commission as to what condition of affairs is meant by convenience and necessity.

It is in defining these terms that the Illinois Supreme Court decision, just rendered, is particularly clear. "Whether the public convenience and necessity require the establishment of a new transportation facility," it says, "is not determined by the number of individuals who may ask for it." Even a considerable number of people, the court goes on to point out, might be convenienced by the new transportation enterprise, but this does not mean that it would be either a convenience or a necessity to the great body of the public. In fact, the court intimates if the amount of traffic taken by the competing bus line should so affect the existing trolley company that it would have to reduce its service or increase its fare, the interest of the public as a whole would be jeopardized.

It is well that these principles of public utility regulations should be restated by the court every so often. While fundamental in their soundness, it should be remembered that utility regulation is not so very old in this country, and that its principles may be lost sight of by, or perhaps are unknown to, each new crop of politicians. It is for this reason that their restatement by a body like the Supreme Court of Illinois is refreshing.

Good Maintenance Important in Improving Public Relations

AT THE recent convention of the National Electric Light Association much time was devoted to the discussion of how to better public relations. Several speakers referred to the importance of service as the fundamental on which good relations can be built, and the need for providing the best of service at all times. Of course, it is not possible for the customer to see the maintenance departments at work, except in some few instances; but they are always behind the scenes, and much of the success of the utility depends on the character of work done by these essential departments.

Much emphasis has been laid on methods of reducing the costs of maintenance, due to the straits in which the railways have been for the past several years. Unfortunately in some cases the costs have been reduced to the point where service has suffered. A few equipment men have overlooked the seriousness of failures during the rush hour. While sometimes it does not mean a great loss in revenue, other cases can be cited where failures have caused regular riders to seek other means of transportation or to walk, either for the one day, or, if breakdowns are too frequent, to get away from the use of the railway's service permanently.

The best is usually the cheapest, and if attention is paid to keeping all parts of the property maintained in the best manner, the total net revenue at the end of the year is likely to be greater, even though more money actually has been spent in its upkeep. Penny-wise methods usually turn out to be pound-foolish, and their use should be discouraged, even though the immediate cost may make a small saving look tempting.

New Philadelphia Cars Will Have Many Modern Devices



Sample Single-End Car of Which 385 Will Be Built for Philadelphia Rapid Transit Company

Single-End Type Is Designed for Either Two-Man or One-Man Operation—All of the New Cars Are to Be Equipped with Safety Devices—The Cost of the New Rolling Stock Will Be $6,500,000

THE outstanding feature of the 520 passenger cars recently purchased by the Philadelphia Rapid Transit Company will be the completeness of the auxiliary equipment. Practically all of the latest devices for use on electric railway cars have been embodied in the design. This large purchase includes 385 single-end cars such as shown in the accompanying illustration of car No. 8000, similar in type to the modified near-side cars now in service, and 135 double-end cars which are a modification of the so-called "Hog Island" type. Car No. 5201, also pictured, is an example of this design. These two sample cars are the only units which have yet been completed.

On the single-end car, sliding center doors and a double step in the well inside the car body will replace the folding door with a single step in the well and a folding step outside, used on the earlier type. It is expected that a reduction in the number of accidents will result from keeping these doors within the lines of the car instead of opening outward where they can be smashed by a passing vehicle. This feature is of particular importance in Philadelphia because of the narrowness of the streets. Moreover, it is hoped by the company to speed up the unloading process by having a larger well inside the car, where more people can assemble in readiness to alight.

All of the cars are to be equipped with standard safety car devices. National pneumatic door interlocking devices will be used as an additional safeguard, with a signal light in front of the motorman to indicate to him when all the doors have been closed. When the 8000-type car is used for two-man operation, passengers will enter at the front and leave by the center door, as in the older cars. Under these circumstances the center doors will be controlled by the conductor stationed on the right-hand side of the aisle immediately in front of the well. This control is similar to that now used on the other cars of the Philadelphia Rapid Transit Company. The pneumatic door engines have their valves mechanically operated by the conductor through a system of rods and bell cranks.

When the car is used for one-man operation, passengers may enter and leave by the front doors, or they may enter at the front and leave by the center door, in which case the center door is opened and closed from the motorman's position. These operations are all controlled by the engineer's valve handle, as in the standard



135 Double-End Cars of the Type Shown at the Right Are on Order. Note New Location of Destination Signs in This View and in End View of Single-End Car Shown at Left



The Top Step Is Shortened Because of the Turnstile



Standard Seating Arrangement for Single-End Cars

safety car practice. In order that door operation may be suited to the use to which the car is put, a selector valve has been placed in front of the motorman immediately below the engineer valve. The position of the selector valve handle determines whether both doors at the front are opened or whether one door at the front and those at the center are opened by the door-opening movement of the engineer's valve.

Consideration is now being given to the question of locating a turnstile of the Syracuse type at the center exit of the car. This device will be used when the car is operated by one man as a front entrance and center exit car or vice versa. For experiment the turnstile in the sample car has been placed just in the rear of the well. In case the car is to be used in two-man service with a conductor, one of the three turnstile arms may be dropped, so as to leave the exit passage free. The position of the turnstile near the well at the center of the car, as shown in the accompanying illustration, is such that it introduced an element of danger in that it distracted the attention of passengers from the step, so that they might fall as they left the car. In order to eliminate this danger, the floor has been mitred to cut off the corner of the well near the turnstile so that a passenger can pass entirely by it before it is necessary to take a step down. Universal safety treads will be used on the steps.

Great flexibility of operation is possible with the car so designed. It is adapted to any kind of service. However, the normal operation will be with two men on heavy city runs, or with one man for lighter traffic as a front-entrance, center-exit car. The cars will always be used as single units and never coupled into trains.

The seating capacity of the new single-end car will be fifty-three, which is greater by two than that of the present cars. The general seating arrangement will be the same as in the present cars, and the increase will be effected by moving back the rear bulkhead. Although this will decrease the capacity of the curved seat at the rear of the car, nevertheless it will make possible the installation of two additional cross-seats. The Brill "Cleveland" type of seat will be used. This is of wooden slat construction, which the Philadelphia Rapid Transit Company believes to be the most economical and sanitary type of seat.

Artificial lighting will be accomplished by two rows of small unshaded electric bulbs. These are arranged in line with and between the hand straps, approximately over the center line of the cross-seats.

The straps themselves are to be the Buffalo handholds. The grip is of white enameled metal and is suspended from the car roof by a chain. Around the chain is a piece of thick rubber tubing which gives a certain amount of stiffening and prevents the strap



A Selector Valve Is Located Below the Engineer's Valve



New Seating Arrangement in Double-End Car

flopping around when the car is in motion. The car signal system will be the Faraday type-E with contact bases. The interior metal trim of the car is to be bronze statuary finish, while the wood work is cherry. The Lucas system is used for interior and exterior finish. The roof will be the arch type with Agasote headlining finished with white Anglo-American enamel. Double-faced Pantasote will be the curtain material.

Hunter signs will be used. In this respect the new single-end car shows a slight variation from previous designs. The name of the destination point will be shown in the center front window instead of being immediately below the large route number in the right-hand window. The route number, however, will remain in the present location.

The new car will have on each side one more window than the old car. Window posts will be of the Brill "Renitent" type, which holds the sash under compression, yet permits its easy removal. The sash is held firmly in place when raised to any desired height. The latter feature is considered by the company to be of great importance, as many accidents have occurred in the past on account of windows dropping upon the arms of seated passengers. This type of window is not a novelty in Philadelphia, having been used on some of the more recent cars. The upper portion of the sash in every second window is to be hinged at the bottom and may be dropped inward slightly in order to afford ventilation, although roof ventilators also will be used. The latter are of the Garland C-1 Jr. type. The car will be heated electrically by Consolidated car heaters.

Although the framework of the new 8000 car is composed of standard-sized members, nevertheless a slight reduction in weight has been effected, the total being only 34,000 lb., as compared with 37,000 lb. for the present car. The over-all length of the car is 45 ft. 6 in., and the over-all width 8 ft. 6 in. The height from rail to trolley base is 11 ft. ½ in. Steel framing is employed throughout, and the sides are of sheet steel, being straight instead of paneled as on the near-side cars. The floor is of wood, the aisle being reinforced with hardwood strips, and at the front end has a slight ramp so that any moisture which accumulates will run down onto the front platform. This in turn is sloped slightly toward the door, thus insuring the motorman a dry place on which to stand.

General Electric K-68 control will be used on the new cars. By means of a ratchet attachment a line switch beneath the car opens with any reverse movement of the controller. Economy meters also will be installed, as this is standard Philadelphia Rapid Transit practice. The air-brake equipment is made by the General Electric Company, while the hand brake is of the Peacock staffless type. Carnegie steel wheels and axles are to be used, the drivers having a diameter of 28 in. and the trailers 22 in. Each car will be equipped with two General Electric No. 275-A outside hung motors, and Tool Steel gears and pinions. Trucks will be Brill No. 39 E-2, having helical and elliptical springs. The cars will be equipped with Kalamazoo trolley wheels and harps, O-B trolley catchers and Imperial headlights.

THE DOUBLE-END CARS

As already stated, the new double-end cars of the 5200 type differ only slightly from the previous design of double-end car, first introduced by the United States Shipping Board during the war period for service to the Hog Island shipyard. The new cars, however, will have this important difference, that one-half of the seats are to be transverse instead of all being longitudinal. There will be altogether ten cross-seats in this car, arranged in two groups of five each, one on the front left-hand side and the other on the rear right-hand side, with a longitudinal seat opposite each group.



On Present Cars the Center Door and Step Open Outward

Another difference from previous types of double-end cars is that the 5200-type car will be equipped with only two motors instead of four. This can be done because it is not intended that the car shall haul a dead trailer, as has been the practice in the past with some of these cars. The motors themselves and most of the other equipment on the car are the same as already described for the single-end car.

Safety car devices and pneumatic door control will be installed on the double-end cars. A selector valve similar to that on the single-end car will be used on the 5200 type, although the door operation will naturally be different on a double-end car. The 5200 type will be slightly

heavier than the 8000 type, having a total weight of 35,000 lb., somewhat less than the present double-end cars.

There will be a marked difference in appearance between the new double-end cars and the single-end cars. In accordance with standard practice in Philadelphia, the double-end cars are to be painted orange in color in contrast to the green of the single-end cars. This is done in order that the public may know at a glance whether an approaching car is of the front-entrance, center-exit type or of the rear-entrance and front-exit type.

Shortly after the completion of sample cars of the new types at the Brill works, where all of the cars are being built, a committee composed of employees of the Philadelphia Rapid Transit Company, Chairman Mitten and President Dunbar made an inspection. A close examination was made of the car and all its working parts by both the employer and employee committeemen, in order that those who operate the cars and those who maintain the cars in the shop should have an opportunity to make suggestions.

Pneumatic control plays a large part in the operation of the new cars. This feature, however, is not without complications inasmuch as the moisture of the Philadelphia climate is such as to cause frequent freeze-ups of the air pipes in winter. There have been included in the design, therefore, enough cooling coils that the moisture in the air may be condensed harmlessly rather than collect at joints in the pipe and freeze up with disastrous results.

The magnitude of the order may be judged from the total cost, which will be $6,500,000. Many automatic and labor-saving devices have been included in the design, and it is felt by the company that the new cars represent a distinct improvement over any others now in service in Philadelphia.

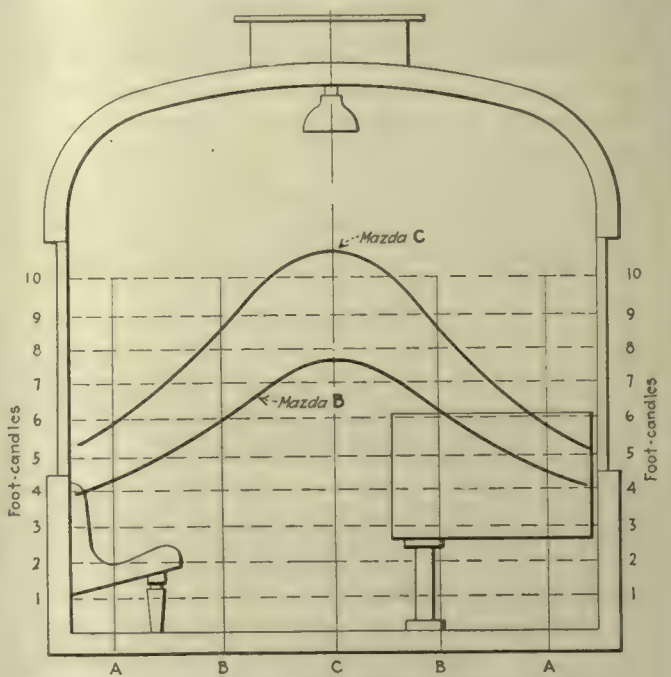
Future Development of Car Lighting

Standards Are Steadily Rising to Follow Industrial and Commercial Practice—The Gas-Filled Incandescent Lamp Is Being Studied

THE passage of laws in several states requiring that the injurious glare from unshaded electric lights shall be eliminated in industrial plants may foreshadow a similar demand for shaded lamps in railway cars. When such a time comes there will have to be a radical change from the customary lighting practice of the present day. The many small unshaded 25-watt lamps will probably have to be eliminated and a smaller number of large lamps with modern reflectors used in their place.

The experience of railway engineers indicates that the 94-watt Mazda B lamps used five in series with center lighting on many cars average close to 2,000 hours in service, and if voltage variations are not excessive they may even continue to burn for a longer time before failure of the filament. However, these lamps are subject to an unavoidable depreciation in candle-power as the tungsten filament evaporates, and they may frequently be expected to fall to 80 per cent or even less of their initial candle-power before final burnout. Economically it would be well, the manufacturers point out, to remove and scrap all excessively old lamps that have fallen to less than 80 per cent initial candle-power, a condition which may be expected to occur at the end of about 1,500 hours continuous burning.

Tests recently made under service conditions show that the center-deck lighting system with 94-watt lamps was giving only about 60 per cent to 70 per cent of the illumination possible with new lamps of the same rating, and inasmuch as the average illumination with new lamps was about four foot-candles, it can easily be seen why a number of car interiors appeared gloomy. The natural supposition would be, in view of the above facts, that either a larger bulb should be used with the 94-watt lamp, so that the deposit of evaporated tungsten on the inside would be kept sufficiently low to allow good light transmission, or that a higher wattage lamp should be installed initially to provide for this depreciation. In fact, for that very reason, the 150-watt Mazda B



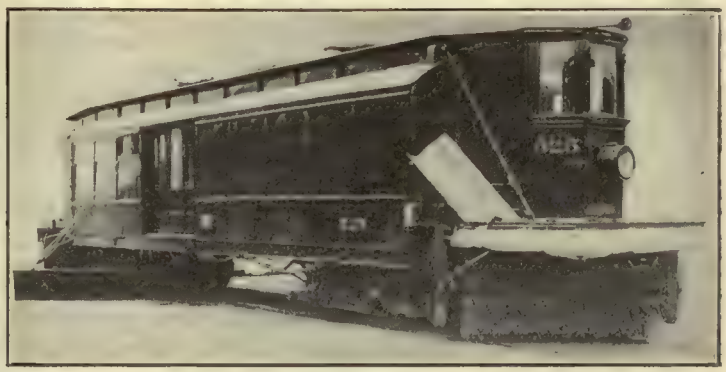
Comparative Intensity of Illumination Directly Under Lamps

lamp does call for a larger size bulb. Such a larger bulb in the vacuum lamp would necessitate changes in reflectors, and does not on that account seem to be the most reasonable solution.

A number of car-lighting tests have recently been made with the object of substituting the gas-filled, or Mazda C, lamp of 75 or 100-watt size for the 94-watt type B lamp. These tests showed that directly under the fixture the C lamp gave nearly 50 per cent more light than the Mazda B, as indicated on the accompanying chart. Midway between fixtures the superiority was not so marked, being only about 20 per cent. Unfortunately, when used five in series on 550 to 600-volt circuits, the failure of a lamp filament in a bulb filled with a mixture of argon and nitrogen usually causes a bad arc, which, backed up by the entire line voltage, may result in the destruction of the lamp base and socket. Car-lighting engineers hope for the satisfactory outcome of research now being carried on to supply a gas-filled lamp suitable for series operations, but the results so far secured have not provided such a lamp and the problem is worthy of considerable thought on the part of railway engineers and lamp manufacturers.

Another alternative which is receiving serious attention is that of reflectors set into the deck of the car. This might be an excellent solution of the car-lighting





Left—Type of Old Car Similar to That Used for Double-Truck Sweeper. Right—Double-Truck Sweeper with Snow Wing as Reconstructed

problem. A slightly higher installation cost would be balanced by a lower maintenance and breakage cost and would afford better eye protection to passengers. Bare lamps within a few feet of the faces of standing passengers, now very common, are a menace to optical comfort and safety. The all-frosted or diffusing bulb lamps, especially for side deck lighting, may grow in favor as an intermediate step in curing the glare evil.

Chainless Sweeper Has Many Advantages

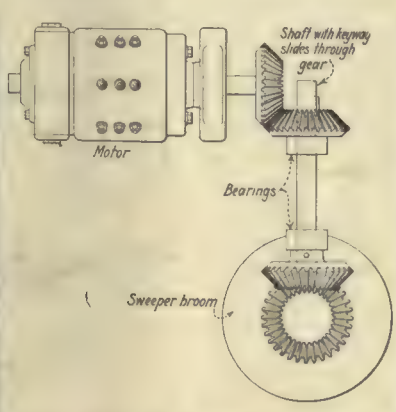
Through Use of Bevel-Gear Drives for the Rotary Brooms, Sprockets and Chains Are Done Away With—A Sliding Shaft Permits Vertical Movement

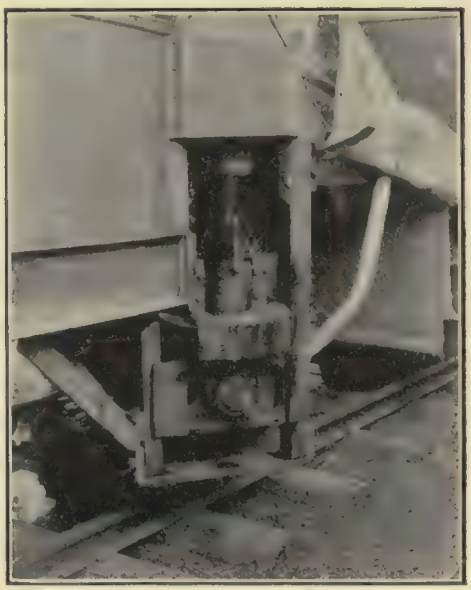
A DOUBLE-TRUCK, chainless sweeper has been built from an old passenger car by the Lehigh Valley Transit Company, Allentown, Pa. Accompanying illustrations show this sweeper as constructed, also an old car of the same type as that used in its construction. The mechanism used for driving the brooms and for raising and lowering them is particularly interesting. The sweeper has brooms at either end and these are driven through bevel gears at top and bottom of a vertical shaft so that no chains or sprockets are used. This type of construction was resorted to in order to get away from the continual annoyance caused by the failure of chains while the sweepers were in service.

At the outside ends the brooms have bearings which are installed in crossheads with guides providing for vertical movement. The crosshead guides are 2-in. x 5-in. steel castings. These are braced securely to the car-body framing, which is reinforced by steel I-beams. Front pipe braces of 2-in. pipe are also provided. The bevel gear on the broom shaft is located just inside one of the pedestals, and a corresponding bevel gear is installed on a vertical shaft immediately above this. The bearings for this vertical shaft also slide in the pedestal, so that the raising and lowering of the brooms causes the vertical shaft to raise and lower at the same time. The bevel gearing at the top end of this vertical driving shaft has bearings fixed to the car body, so that in raising and lowering the broom the vertical shaft with its keyway slides through the top bevel gear. The motor for driving the broom is connected directly to the top bevel gearing, and an individual motor is provided for driving each broom. The various steel castings required for the crosshead guides and the bevel gears themselves were made in the steel foundry of the railway company.

The mechanism used for raising and lowering the brooms consists of a chain attachment to each end of the broom shaft. This passes over a sheave on the car body directly above the broom shaft and thence to additional sheaves located on a shaft just at the end of the car body. This latter shaft has a sheave attachment in the center and is connected through a chain and rod to a brake cylinder, so that by admitting air to this cylinder the various sheaves are rotated and the brooms raised. They are lowered by their own weight. The







Top—Diagram of Geared Drive for Sweeper Brooms

Left—Motor Drive on Inside of Sweeper for Brooms

Right—Crosshead and Guide, Together with Geared Drive

rods connected to the brake cylinder have holes with side guides so that pins can be inserted after the height is adjusted as desired, and thus the brooms can be held in any desired location.

The sweeper drums as well as the brooms outside of the cane are made much larger in diameter than other sweepers used by the railway. The wooden drum for holding the cane is 20 in. in diameter and the diameter outside the cane is 42 in. As a result of the use of these large diameters long life is obtained from the sweeper cane. During the past winter this sweeper was used during seven severe snowstorms and in about as many light storms. The same cane was used throughout the season without the necessity of replacement, while other sweepers which performed the same service required new cane after every storm, due to the breaking of the cane on account of the small diameter of the drums.

The car is also equipped with side snow wings for cleaning the area adjacent to tracks. One of the accompanying illustrations shows a side wing in position. The raising and lowering of the wing is accomplished by block and rope operated through an opening in the side of the sweeper. Chain attachments are provided for holding it in position and taking the strain of snow removal. These are fastened to the steel side sills. As may be seen by comparing the construction of the sweeper with that of the old car from which it was made, the end cab and mechanism for supporting the broom were added at the end. The center portion is used for carrying tools and for mounting the motors, brake cylinders and resistors necessary in operation. The operation of the brooms and their raising and lowering are controlled from the cab at either end. All wiring is carried overhead, inside the car, so as to keep it dry and thus minimize the danger of short circuiting. The resistors which are mounted inside the sweeper help to keep it heated.

Checking Headway Records in Racine

VARIOUS methods have been described in past issues of this paper of checking Nachod headway records to determine the extent which cars are ahead or behind schedule. A very simple plan for doing this very necessary work has been developed in Racine, Wis., where the city cars are operated by the Milwaukee Electric Railway & Light Company. There are four headway recorders in Racine and their records are checked daily.

A triangular box has been constructed, about 30 in. long, to hold a glass plate of this length and 8 in. wide, or the width of the recorder sheet. A master chart, or one showing the correct spacing of the cars, is laid down on this glass plate and held flat at the edges by brass strips under which it can slide. The headway record is then laid on top of this master chart, and by means of light from a lamp in the box the differences between the times when the cars should pass the time point and their actual times of passing can readily be checked.

At the bottom of the box is a ruler held by three levers so that it can be raised or lowered on the glass plate yet always remain parallel with the bottom of the box. This simplifies somewhat the work of following through the lines on the record and consequently of checking the figures.

The company keeps a record of all differences between

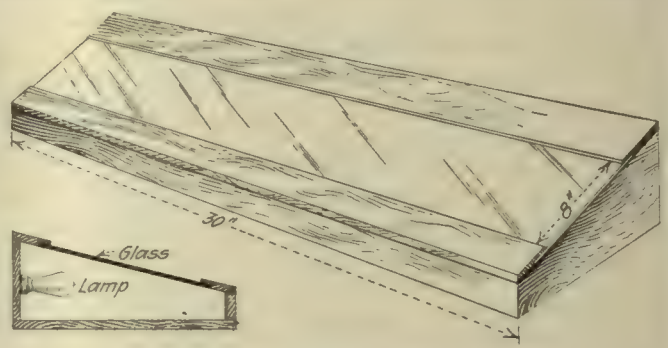
MONTHLY REPORT OF CARS OFF SCHEDULE, RACINE CITY DIVISION, M. E. R. & L. CO., FOR JANUARY, 1923

Compiled from Records of Four Nachod Headway Recorders

Total scheduled car passes	37,286
Total car passes checked	32,621
Per cent checked	87.4
Total early — two minutes or more	89
Per cent early	0.27
Total late — five minutes or more	266
Per cent late	0.82
Total off schedule	355
Per cent off schedule	1.09

			Number	Minutes
Cars ahead of time			89	178
Cars late			266	1,551
Causes of delay:				
Heavy travel	82	450		
Weather conditions	16	97		
Accidents	7	47		
Other cars	37	226		
Total general traffic conditions			142	820
Track				
Power	5	31		
Rolling stock	34	209		
Transportation	20	120		
Total operating failures			59	360
Vehicles on track	3	20		
Bridges	20	120		
Steam railways	27	151		
Total foreign causes			50	291
Late from previous trip			15	80
			266	1,551

the schedule times and the actual times at which cars pass the time points, as well as the causes for all delays. This record is kept in the form illustrated, which is for January, 1923. A record is also kept of all interruptions to the operation of the recorders, as well as the cause and the total number of minutes delay occasioned



Box for Checking Headway Records in Racine

thereby. Headway recorders have been found useful not only for checking car headways but also, when set at points on city lines just beyond short route terminals, to determine whether there has been any short routing of long-route cars.

Preventing Grade-Crossing Accidents

IN A RECENT published interview Commissioner Thomas J. Campbell of the Public Service Commission of Oregon suggests that every automobile driver be required to pass a federal test concerning rules of the road, and that every vehicle should be required to come to a full stop before crossing any railroad at grade. The commissioner's suggestions are given weight by a recent check on motorists approaching two obscured grade crossings in the outskirts of Portland. Of 200 drivers observed, fifty-six looked both ways on approaching the crossing, thirty-three looked in one direction only, one hundred and ten gave no indication that they realized that they were crossing a railroad, and one came to a full stop before crossing; this one, however, being a regular stage vehicle, was required by law to stop.

Financial Aspects in New Orleans Report

Actual Return Being Earned Under Present Operation Is 5.58 per Cent —Decreased Expenses and Increased Earnings Must Be Realized if Allowed 7.5 per Cent Return Is Earned—Estimated Savings Possible Amount to $2,400 a Day—This, Together with Increased Earnings Expected as Result of Rerouting and Better Service, Will Make Possible Full Return, Including a Reduction in Fare, by the End of 1924—Plans Can Be Carried Out with $500,000 New Capital Annually

THE seventh and last section of the report by John A. Beeler for the Department of Public Utilities of New Orleans on the local street car system deals with the financial results that have obtained under the present plan of operation and what may be expected if the recommendations made are put into effect. The past operation of the company is indicated by a condensed statement of earnings and expenses for fifteen years back as shown in Table I. The rates of fare applying during the period for which these figures are compiled were as follows:

5 cents prior to Oct. 10, 1918.
6 cents, Oct. 10, 1918, to Oct. 23, 1920.
8 cents, Oct. 23, 1920, to Sept. 28, 1922.
7 cents, Sept. 28, 1922, to the present time.

The revenue and expenses by years per car-mile and per car-hour are shown in Table II. It will be seen from this table that the expense per car-mile was 39.6 cents in 1922, or nearly three times what it was in the pre-war days. The length of the car ride has not been shortened; if anything, the average rider travels farther. In 1912 the total expense of operating a car for one hour was $1.29; last year it was $3.57. A car now in twenty-two minutes rolls up as much expense as it did in an hour ten years ago.

It is explained that the percentages of expense required by the various operating accounts have not fluctuated greatly. A renewals and replacement account was not provided until 1910 and then only inadequately. Last year $740,000 was charged to this account. This was on a basis of about 3 per cent of the rate base. It was equivalent to 9 per cent of the revenue. The report states that so much remains to be done to put the property in efficient operating condition that this amount may be increased temporarily. Eventually, however, this rate should be more than ample.

The rate base was recently fixed at $25,000,000 and the rate of return agreed upon at 7.5 per cent. To provide for new equipment and other additions the rate base has since then been considerably increased. At the time the report was written, the figures showing the average rate base allocated to the railway department of the company for the year were not available. It is shown that the gross income of $1,707,699 earned in 1922, which includes $51,708 of miscellaneous income, was sufficient to pay 7.5 per cent on a value of but $22,769,000, whereas it is known that the rate base with the new equipment on order is not far from $27,000,000. Assuming it at the latter amount, the rate of return equals 6.32 per cent. The amount lacking to cover the allowed return is $317,301.

During the year 1922 the fare was at the rate of 8 cents until Sept. 28, when the 7-cent rate became effective. The last quarter of the year was wholly on the 7-cent fare basis, and therefore the earnings from operation for this quarter reflect more nearly 1923 conditions. On this basis a gross corporate income of $1,506,057 is indicated, which is insufficient by $518,943 to pay 7.5 per cent on a $27,000,000 rate base. The actual rate earned equals but 5.58 per cent. To pay it in full would require $2,025,000, which is equivalent to 26.3 per cent of the combined operating revenue and miscellaneous income of the railway. The total operating deductions require 80.4 per cent. Reduction of these facts to a simple businesslike statement shows that for each 100 cents received, 106.7 cents are required to meet the outgo.

With the installation of the new plan, two factors of importance will be brought into action. Operation, being more efficient, will effect important savings, and the system, covering increased and well-populated territory, will serve more patrons. The first factor reduces expenses, the other increases revenues. Of the track changes, betterments and improvements outlined in earlier sections of the report, certain ones are properly chargeable to capital account and others to expense. New cars, except when they replace old equipment, should go to capital. Virtually all of the trackwork proposed must go to expense as it does not represent an increase in trackage. It represents the cost of replacing the tracks where they will better serve the city. The cost of the proposed betterments is summarized as follows:

Track changes, including extensions	$1,698,960
Canal street construction	304,000
Loading platforms	25,000
Rebuilding and modernizing 150 small cars	270,000
Other items, including civic improvements	200,000
Total	$2,497,960

These expenditures must of necessity come from the renewals and replacement account. The accruals to this fund on the present basis, 3 per cent of the rate base amount to $800,000 annually. However, the full amount will not be available for the items covered in this plan, as renewals and replacements must be made on other parts of the plant. These expenditures can be provided for out of this account by spreading them over a period of years.

If spread over ten years, annual installments of $250,000 each could be taken from the renewals and replacement reserve to cover the foregoing. At the present rate of accrual, less than one-third annually would be necessary to defray these installments. The interest on the funds advanced to make these betterments would, however, be an additional charge against future earnings. At 7.5 per cent this would average about $93,700 annually for ten years. Another way, and one that would save the interest charge, would be to "pay as you go" by using one-third of the renewals and replacement reserve, augmenting it by any available surplus earned until the expense of the charges is wiped out.

Under the proposed plan, the new capital expenditures

TABLE I—NEW ORLEANS PUBLIC SERVICE, INC., RAILWAY DEPARTMENT—OPERATI

	1908 Dollars	1909 Dollars	1910 Dollars	1911 Dollars	1912 Dollars	1913 Dollars	1914 Dollars	1915 Dollars	1916 Dollar
Total revenue from transportation	3,900,834.85	3,959,126.83	4,046,313.00	4,158,779.97	4,274,059.57	4,379,919.85	4,374,064.63	4,167,752.55	4,393,367.
Other street railway revenue	12,103.29	12,017.39	23,465.96	21,092.68	20,967.70	21,232.11	24,442.33	30,482.29	29,409.
Total operating revenue	3,912,938.14	3,971,144.22	4,069,778.96	4,179,872.65	4,295,027.27	4,401,151.96	4,398,506.96	4,198,234.84	4,422,777.
Operating expenses:									
Maintenance of way and structures	265,291.85	265,894.42	281,485.42	310,425.42	336,655.93	322,294.18	297,959.38	276,148.10	294,263.
Maintenance of equipment	447,494.75	397,828.74	384,810.16	322,354.20	335,880.16	366,182.46	324,213.69	323,742.20	341,957.
Traffic expenses	43,875.94	53,446.86	55,146.45	54,527.97	42,786.03	38,272.51	9,207.55	16,909.51	21,370.
Conducting transportation	1,317,610.13	1,278,997.08	1,299,480.29	1,389,757.85	1,420,747.09	1,459,985.43	1,466,101.56	1,473,424.40	1,496,431.
General	273,242.86	276,507.34	279,577.55	316,382.82	260,865.52	252,419.12	243,937.89	252,186.98	283,341.
Total operating expenses	2,347,515.53	2,272,674.44	2,300,499.87	2,393,448.26	2,396,934.73	2,439,153.70	2,341,420.07	2,342,411.19	2,437,364.
Net operating revenue	1,565,422.61	1,698,469.78	1,769,279.09	1,786,424.39	1,898,092.54	1,961,998.26	2,057,086.89	1,855,823.65	1,985,412.
Taxes	332,923.00	329,861.83	344,487.33	361,346.68	373,875.74	478,009.10	498,140.50	493,652.48	484,157.
Net	1,232,499.61	1,368,607.95	1,424,791.76	1,425,077.71	1,524,216.80	1,483,989.16	1,558,946.39	1,362,171.17	1,501,255.
Renewals and replacements reserve	.....	.....	112,000.00	85,296.98	53,982.19	103,732.46	147,123.50	123,269.21	173,022.
Net operating income	1,232,499.61	1,368,607.95	1,312,791.76	1,339,780.73	1,470,234.61	1,380,256.70	1,411,822.89	1,238,901.96	1,328,232.
Deductions per cent of revenue	68.5	65.5	67.7	67.9	65.8	68.6	67.9	70.4	70.0
Net income per cent of revenue	31.5	34.5	32.3	32.1	34.2	31.4	32.1	29.6	30.0

for the next few years should not be large. The most important single item will probably be the trailer equipment. An average addition of $500,000 per annum should be ample to care for the railways' new capital requirements for the next three years.

Were it possible to install the proposed plan overnight, the annual operating expenses would be reduced $853,817. This is equivalent to 11.17 per cent of $7,742,436, the present rate of operating revenue. The savings expected with the installation of the plan are summarized as follows:

Track maintenance—3.25 miles less track to maintain at $4,000 per mile	$13,000
Maintenance saving on Canal Street track rearrangement	35,000
Switchmen released by electric switches	5,840
Energy conservation—$108.50 daily by use of energy saving devices	39,602
Use of light-weight trailers	93,000
Remodeling 150 small cars into safety cars for one-man operation	273,385
Routing changes save 563 car-hours daily at $2 each	410,990
Total saving	$870,817
Deduct cost of street collectors	17,000
Total net saving	$853,817

As to the time required to make effective the proposed plan of operation, the report comments that if the work is pushed with vigor all of the important track changes, betterments and extensions should be completed or nearly completed by the end of 1923. The remodeling of the cars should proceed immediately, line by line being equipped as fast as practicable. The end of 1924 should see the system working completely under the new plan.

The most important factors affecting revenues are the growth in population, which has recently averaged 7,039 annually, and the extent of the facilities available. The population served will probably be very close to 450,000 in 1925. The present effective main line mileage is 171. Replacing 34 miles of the present ineffective mileage where it becomes effective by better serving the community brings the total up to 205 miles. This should be completed and in operation by the forepart of 1924. That year will receive at least a partial benefit, and the year 1925 should have the full benefit, resulting from the operation of the then wholly rounded out system. With adequate service the riding habit should improve. At least the pre-war average should be maintained.

The estimated revenue for the future, as shown in Table III, is on the basis of 1.6 revenue passengers per capita per mile of effective main line. The savings in operation should be realized, one-third at least during 1923, two-thirds in 1924, and all in 1925. Taxes are estimated at 10 per cent of the gross for each year. Renewals and replacements are based on 3 per cent of the estimated rate base for the year. Miscellaneous income is based on the amount earned during the year 1922. Amortization of interest is averaged over a period of ten years at a rate of 7.5 per cent. Fares are based on the present rate of 7 cents. Under these conditions the results for the years 1924 and 1925 are estimated as in Table III.

The surplus of $408,000 earned over the required

TABLE II—NEW ORLEANS PUBLIC SERVICE, INC., RAILWAY DEPARTMENT — REVENUE AND EXPENSES

CENTS PER CAR-MILE

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Total operating revenue	20.96	21.21	21.41	21.70	21.99	22.21	22.41	21.62	22.19	23.26	27.18	34.33	37.69	47.43	49.55
Maintenance way and structures	1.42	1.42	1.48	1.61	1.72	1.63	1.52	1.42	1.48	1.57	2.00	2.77	3.22	5.21	4.85
Maintenance of equipment	2.40	2.12	2.02	1.67	1.72	1.85	1.65	1.66	1.71	1.96	2.47	4.54	6.44	6.34	6.18
Traffic	0.24	0.29	0.29	0.28	0.22	0.19	0.05	0.09	0.11	0.08	0.02	0.04	0.16	0.02	0.15
Conducting transportation	7.06	6.83	6.84	7.22	7.27	7.37	7.47	7.59	7.51	8.13	11.36	12.85	14.49	16.04	15.11
General	1.46	1.48	1.47	1.64	1.34	1.27	1.24	1.30	1.42	1.64	2.05	1.84	2.60	3.44	4.29
Taxes	1.78	1.76	1.81	1.88	1.91	2.41	2.54	2.54	2.43	2.56	3.46	2.93	3.70	3.93	4.53
R. & R. reserve	...	....	0.59	0.44	0.28	0.52	0.75	0.64	0.87	0.77	0.84	2.05	4.61	3.97	4.46
Total expense	14.36	13.90	14.50	14.74	14.46	15.24	15.22	15.24	15.53	16.71	22.20	27.02	35.22	38.95	39.57
Net operating income	6.60	7.31	6.91	6.96	7.53	6.97	7.19	6.38	6.66	6.55	4.98	7.31	2.47	8.48	9.98

CENTS PER CAR-HOUR

Total operating revenue	187.88	188.45	190.36	194.98	197.10	199.05	200.54	189.94	195.44	207.75	244.78	304.89	331.57	430.41	447.48
Maintenance, way and structures	12.74	12.62	13.17	14.48	15.45	14.58	13.59	12.49	13.00	14.07	18.03	24.57	28.33	47.22	43.83
Maintenance of equipment	21.49	18.88	18.00	15.04	15.41	16.56	14.78	14.65	15.11	17.49	22.19	40.31	56.68	57.56	55.81
Traffic	2.11	2.54	2.58	2.54	1.96	1.73	0.42	0.77	0.94	0.68	0.19	0.37	1.44	0.19	1.38
Conducting transportation	63.26	60.69	60.78	64.83	65.20	66.03	66.84	66.66	66.13	72.61	102.34	114.16	127.42	145.56	136.41
General	13.12	13.12	13.08	14.76	11.97	11.42	11.12	11.41	12.52	14.67	18.44	16.38	22.87	31.21	38.77
Taxes	15.98	15.65	16.11	16.85	17.16	21.62	22.71	22.33	21.39	22.85	31.12	26.01	32.56	35.68	40.85
R. & R. reserve	.....	.....	5.24	3.98	2.48	4.69	6.71	5.58	7.65	6.88	7.59	18.20	40.52	36.00	40.28
Total expense	128.70	123.50	128.96	132.48	129.63	136.63	136.17	133.89	136.74	149.25	199.90	240.00	309.82	353.42	357.33
Net operating income	59.18	64.95	61.40	62.50	67.47	62.42	64.37	56.05	58.70	58.50	44.88	64.89	21.75	76.99	90.15

E AND EXPENSES 1908–1922

7 ars	1918 Dollars	1919 Dollars	1920 Dollars	1921 Dollars	1922 Dollars
9.95	4,962,272 12	6,510,646.24	7,037,744.64	8,813,821 83	8,190,383.28
9.89	28,872.56	28,560.59	32,635.16	32,054.56	29,814.60
9.84	4,991,144.68	6,539,206.83	7,070,379.80	8,845,876.38	8,220,197.88
8.23	367,577.82	526,875.19	604,017.54	970,542.53	805,260.72
7.79	452,547.16	864,461.00	1,208,721.10	1,182,901.21	1,025,208.81
3.29	3,802.32	7,982.63	30,713.32	3,830.15	25,321.71
7.95	2,086,675.08	2,448,597.16	2,717,029.04	2,991,480.21	2,505,820.06
5.50	376,035.65	351,320.30	487,714.18	641,515.37	712,127.39
2.76	3,286,638.03	4,199,236.28	5,048,195.18	5,790,269.47	5,073,738.69
7.08	1,704,506.65	2,339,970.55	2,022,184.62	3,055,606.91	3,146,459.19
4.51	634,541.77	557,889.51	694,257.09	733,253.23	750,468.32
2.57	1,069,964.88	1,782,081.04	1,327,927.53	2,322,353.68	2,395,990.87
8.46	154,658.46	390,400.00	864,000.00	740,000.00	740,000.00
4.11	915,306.42	1,391,681.04	463,927.53	1,582,353.68	1,655,990.87
	81.7	78.7	93.4	82.1	79.9
	18.3	21.3	6.6	17.9	20.1

return on the rate base for the year 1924 is sufficient to reduce the fare 0.3 cent for each of the 133,000,000 revenue passengers. This would indicate, provided no valid claim exists against the surplus on account of past deficiencies or for other causes, that a ticket rate of four for 25 cents could be inaugurated during the latter part of the year, probably about Sept. 1, the cash rate remaining at 7 cents.

The surplus of $1,106,900 shown on the 7-cent fare basis for the year 1925 divided among the 147,000,000 revenue passengers would give an equivalent of 0.8 cent reduction for each one. This would indicate that the four-for-a-quarter ticket rate could be maintained throughout the year.

Or under the pay-as-you-go plan, the report continues, by applying the surplus as shown above and utilizing one-third of the renewals and replacement accruals, it is estimated that the entire cost of the installation of the proposed plan could be met by the latter part of 1925. This would save the interest on the ten-year amortization plan, amounting to some two-thirds of a million dollars, during the seven succeeding years, or would simply mean that the initial fare reduction would be postponed for a period of about thirteen months.

TABLE III—OPERATING STATEMENT FOR NEW ORLEANS ESTIMATED FOR 1924 AND 1925, TO SHOW RESULTS OF BEELER RECOMMENDATIONS

	1924		1925	
Operating revenue		$9,431,400		$10,441,300
Operating deductions:				
Expenses	$5,098,600		$5,256,100	
Renewals and replacements	840,000		755,000	
Taxes	943,100		1,044,100	
Amortization interest	93,700		93,700	
		6,975,400		7,248,900
Net operating income		2,456,000		3,192,400
Miscellaneous income		52,000		52,000
Gross corporate income		2,508,000		3,244,400
Allowed return		*2,100,000		**2,137,500
Surplus		$408,000		$1,106,900
Ratio of operating deductions to operating revenue		0.740		0.695

* 7.5 per cent on $28,000,000
** 7.5 per cent on $28,500,000

In considering the possibility of fare decreases, the report states that the enlarged application of the one-man principle of operation is the factor that seems to offer the greatest opportunity for bringing about a substantial reduction to the car rider. It is evident, however, that no mysterious waving of a managerial wand will bring about an early return of the 5-cent fare. There are other ways of reducing the fare, such as cutting operations generally, reducing maintenance of track and equipment and loading the cars heavily. Such temporary expedients as these have all been tried in New Orleans, and the public is familiar with the results. Few, if any, want to see a return to these conditions.

Warning is given that the inauguration of the new plan will not be an easy task. There will undoubtedly be times when the public will be inconvenienced, temporarily at least. The hearty co-operation of the public, however, should be accorded the management in making these changes. When fully completed, the enlarged and improved service will not only be rendered more efficiently and economically, but will be of such a character as to encourage and develop the future growth and welfare of New Orleans.

The Kind of Traction System Serving Havana, Cuba

Single-Truck Cars Are Necessary Due to Extreme Narrowness of Streets with Resulting Sharp Curves—Climatic Conditions Require Special Features of Design

BY OTTO GOTTSCHALK
Engineer of Railway Equipment Department
Havana Electric Railway, Light & Power Company, Havana, Cuba

THE Havana Electric Railway, Light & Power Company, Havana, Cuba, operates an average of 450 cars carrying 375,000 passengers per day. The cars are mounted on single trucks and are arranged for single-end operation. They have a length of 32 ft. over all and a width of 7 ft. 1 in. at the bottom of the side sills. The sides curve outward, which gives a width of 7 ft. 9 in. at the window rest. The interior height from floor to ceiling is 8 ft. 4 in. and the seating capacity is thirty-six passengers.



New Type Cars of Havana Electric Railway

It is necessary to construct all cars within these dimensions due to the narrow streets in the downtown section, many of which have just sufficient width from sidewalk to sidewalk to permit a car and other vehicles to pass. All curves in this section are of very short radius, the minimum being 27½ ft. Standard 4 ft. 8½ in. gage track is used. There are many points where the fenders overhang the sidewalks and in some cases have to be raised to prevent fouling the buildings when cars pass around the curves. An illustrated article giving some of the difficulties resulting from the narrow streets was published in the ELECTRIC RAILWAY JOURNAL for Aug. 26, 1916.

The geographical layout of the city with its narrow streets makes single-track operation necessary for most routes. Most of the streets have been designated as

one-way streets for traffic, and operation under these conditions is very severe, particularly with reference to wheels and other truck parts. Both running rails are of the grooved type and few derailments take place regardless of the chipped flanges that sometimes develop.

One other serious difficulty that we have to contend with is a double overhead trolley system which results in many trolley pole dewirements at crossings and curves, and also requires the constant attention of conductors when passing these points.

Two types of passenger cars are used. One an old design similar to the single-truck cars with monitor roofs manufactured by the J. G. Brill Company about the year of 1900. This design is being replaced, however, in favor of a new design adopted as standard for all future construction.

A detailed study was made of service conditions in Havana, taking into consideration the tropical climate,



Rattan Covered Seats are Used

comfort of the passengers, durability of the material used, weight, first cost and maintenance requirements before the first car of new design was built. We believe that units transporting passengers for short periods of time do not require a fine interior and exterior finish, but should have a neat, cheerful, comfortable and durable finish with a color scheme that is restful to the eyes after looking at objects exposed to the intense rays of the sun usual during the Cuban summer.

Electric cars of necessity carry all types and classes of passengers and are subjected to constant contact with traffic. Rapid deterioration of wood and iron due to climatic conditions in Cuba is much more pronounced than in the United States. Paints must act as a preservative, and the colors selected must withstand the intense rays of the sun. Lap joints of wood, of wood and iron and of iron alone are used so as to prevent moisture from entering these joints during torrential rains.

The new design was made to conform to the old as much as possible, as employees are less confused and more familiar with the work and a reasonable standard is maintained. Duplicate parts were fabricated and the extra parts were used as samples for future construction, as very few of the railway company's employees understand drawings. The monitor roof of the old design was discarded in favor of an Agasote arched roof and ceiling with no other supporting members except 1½-in. x ⅜-in. T irons. Both front and rear vestibules are inclosed, and doors of a folding hand-operated type are used on the front end. There are no doors on the rear, only a Pantasote curtain with a heavy steel roller being used. The space between seats was increased ½ in. from that used with old type cars, the hand brake was shifted to the center of the platform so as to permit passengers to disembark more rapidly and the aisle space was increased to 26 in., the old cars having an aisle of 17 in. Bulkheads and doors have been done away with and a pipe framework substituted.

These changes in the interior of the car body were made possible by removing the window pockets, bulkheads and monitor roof. Windows are arranged to raise instead of to drop into pockets. The truss rod formerly located in the interior of the car has been eliminated, a solid piece of flat iron ½ in. x 6 in. x 22 ft. being installed between the side sill and the truck sill. This is placed edgewise and the two sills are bolted together through the flat iron. By doing this, the underframe is strengthened and there is less possibility of joined members becoming loose due to oscillation.

The side sheathing consists of No. 16-gage black sheet iron with no other trimming on the interior of the car body. We consider this good practice as it is desirable to have a free circulation of air throughout the car body, to dry out any moisture resulting from a rain storm. There is no necessity for preventing the cold air from entering cars in Havana. On the contrary, it is desirable to have a free circulation of air and our only trouble is to keep the water out of the car and from entering the joints or corners.

Car-body frames are constructed of native hardwood which resists dry rot and insects. However, longleaf pine imported from the United States is used for the platform outriggers. All wood is painted with white lead and linseed oil before joining, iron parts are painted with lead and linseed oil, strips of canvas are soaked in white lead and are applied wet between iron and wood and iron and iron when there is a possibility of water entering. This insures watertight joints. All cars are equipped with cross-seats with cane backs and cushions.

The light wiring runs in conduit down the center of the ceiling, which is painted with a gloss white enamel so as to reflect the light rays. The lighting system is arranged in two circuits, each containing seven lamps. During the period of darkness full line voltage is used and 10 per cent voltage during the daylight. The low voltage causes the lamps to burn at a dull red, which keeps the filament in a flexible condition and eliminates breakage due to vibration. This arrangement increases the life of lamps, eliminates waste of current from short-circuited filaments and also reduces the labor for replacing defective lamps.

Cables from the trolley bases pass through the roof and enter the iron stanchions used as aisle spacers and supports for the bulkheads. Two circuit breakers and the light switch are installed at the operating end of the car. Controllers are of a late type, known as K-39-F. They have individual blowout coils and are arranged so that dynamic braking is obtained by moving the reverse handle to the reverse position. Cars can thus be brought to a stop or under control either on a grade or level track in the event that the motorman loosens his hand brake and has no power for reversing. This also gives a quick and efficient stop without damage to the motors when attempting to avoid a collision by reversing. The exteriors of cars are painted chrome yellow and white, the roofs are painted gray, ceilings are covered with a gloss white enamel and the remaining interior finish is olive green. All cars are constructed in the railway's shops of semi-dried out woods. These cars have had an average life of about twelve years, whereas a steel car would have a life here of hardly more than eight years.

Carrying Safety to the Public—VIII*

Women Can Play a Large Part in an Organized Safety Campaign—The Lesson for the Mother Is that Her Greatest Duty Is to Teach Safety to Her Children—The Work Can Be Organized Through the Women's Clubs

By C. W. Price
Vice-President in Charge of Public Safety, Elliot Service Company, New York City.

BECAUSE of the fact that women are the natural conservators of human life; because women are the molding influence in the home; because women are coming more and more to take an active part in civic activities, especially along lines having to do with the general welfare of the community; because men instinctively give women the right to speak out and demand that the home and the family be protected; because of these facts women are destined to play even a more important part than men in the future development of community safety. In every community women are becoming alarmed about the accident situation, realizing as they do that the increasing hazards of the streets are literally stalking up to their very doors and threatening the life of their families. This awakened interest on the part of the women needs only to be properly organized and properly led in order to become possibly the most potent single force in arousing public sentiment and bringing about law enforcement.



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This Mother Is Teaching the Most Important Safety Lesson to Her Children

There never was a more propitious time than the present for enlisting the co-operation of women of all classes in an aggressive campaign to eliminate accidents, especially accidents to children.

Of the 14,000 children killed in the United States in 1922 by accident, more than half were babies five years of age or younger. Of those that were of school age at least 95 per cent were not killed at school, or going to and from school, but were killed in and around the homes, largely because they had not been instructed properly and their play had not been supervised properly. These significant facts throw a flood of light upon the whole problem of safeguarding child life. No material reduction in accidents to children will be possible until the fathers and mothers are thoroughly aroused to the necessity of systematically instructing their children in safety and carefully supervising their play. Women should be made to appreciate that the child of today is born into an environment so radically different from the environment of even twenty years ago that it calls for an entirely new set of habits, a new kind of knowledge and discipline not dreamed of twenty years ago before the advent of the automobile. This applies not only to the children of the poor in the more congested districts of our great cities, but likewise to the children in every community and in every walk of life. So serious has the situation become in most cities of any size that mothers are taking their children by the hand and escorting them to and from school in order to make sure that they return home safe in the evening. So recently has this present traffic situation developed, practically in the last ten years, that people have not awakened to the seriousness of allowing the continued existence of such a menace to human life. From present indications it will be only a year or two when in every community public sentiment will have reached the point where some drastic action will be taken. It behooves public utility executives and others interested in traffic safety to take advantage of this awakened public interest and to guide the efforts along sane and instructive lines which have proved successful in other communities.

A prominent police commissioner made the statement

*Eighth of a series of ten articles.



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Escorting the Children Across a Dangerous Street Saves Lives

that if each mother would thoroughly instill the one simple rule into the minds of her children most of the deaths and serious injuries to them on the street would be eliminated. The rule is this: "When I start to cross the street I look to the left, and when I get to the middle of the street I look to the right." The mother shown in the picture on page 1083 has taken her two children down to the curb and is giving them a practical lesson in this simple rule.

Parents must be made to appreciate the fact that just as health instruction has come to be a vital part of the instruction of children in every well-regulated home, so safety must be given the same important place, and thus children will grow up with habits of caution, just as they now grow up with habits of cleanliness thoroughly instilled into their little minds. When safety is thus given an important place in the home life it not only molds the children, but it also influences the adult members of the family, and thus each of the thousands of homes becomes a center of influence to propagate the safety idea.

The progressive women's clubs of today are more and more taking up in a serious and aggressive way matters having to do with the welfare of the community. It has been found from the experiences in many cities that community safety is a subject that appeals to the members of women's clubs, and is a work which women's clubs are peculiarly equipped to promote. In securing the co-operation of all the women's clubs in a community during the initial stage of organizing a community effort it is well to call together their presidents, and to present to them a comprehensive outline of the purpose and scope of the campaign, specifically indicating what the women can do. Each president should be urged to appoint a special committee on safety in her club, and to give safety an important place in the program of activities for the year. Each club should be asked to arrange for at least one special program on safety at which a speaker from the speakers' bureau would present the subject.

Two lines of activity should be urged upon the women's clubs. First the need of devising ways and means of reaching and influencing the mothers properly to train and supervise their children; second, the women's clubs should give their whole-hearted support to the work of safety instruction in the schools. It has been found that when safety instruction is newly introduced into the curriculum the teachers will be encouraged to do more thorough work if they know they may count on the support of the mothers in the community.

The women's clubs can do much in securing proper publicity for safety, especially for safety of the children. The women can also help in securing the active co-operation of the churches and Sunday schools in promoting the safety idea.

The Washington Safety Council has devised a most successful means of encouraging women's clubs to give safety an active place in their programs and to sustain interest in safety throughout the year. This is done by means of a monthly bulletin, each issue of which is sent to the president of every woman's club, citizens'



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The Baby that Mother Has Forgotten



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"Catching On" Has Caused Many Deaths

association and parent-teachers' association. The bulletin contains a complete analysis of the accident experience in Washington during the previous month, with special emphasis on accidents to children. Four or five stories of the most serious accidents are included. The bulletin also contains interesting new items and suggestions regarding ways and means for promoting safety. Each club president is urged to read this report at the regular monthly meeting. Thus the members are kept informed of the accident situation and are constantly stimulated to action.

Locomotives for New Zealand Electrification

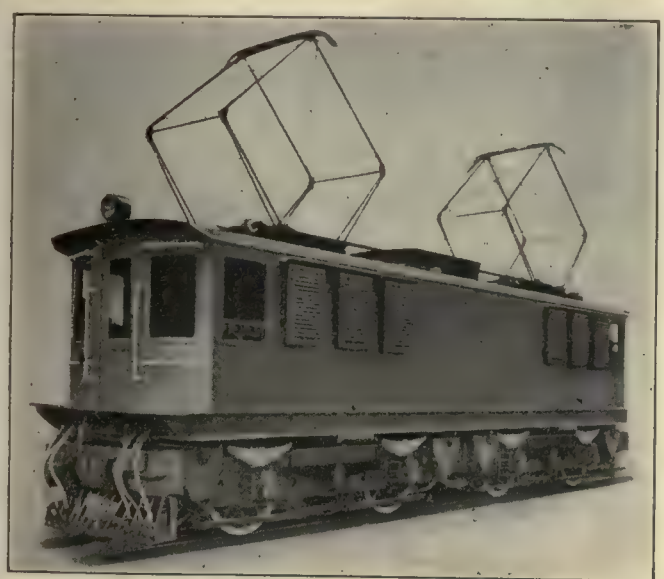
THE Midland Railway, South Island, New Zealand, is electrifying the section through Arthur's Pass on the 1,500-volt d.c. system. Five passenger and freight locomotives, and a battery locomotive for the inspection of the overhead line and repair purposes, are under construction by the English Electric Company, at Preston.

This electrification is through the tunnel under Arthur's Pass which pierces the high range of mountains known as the Southern Alps. The route length now being electrified is 8.4 miles, the total single-track mileage involved being 10.4. The tunnel is 5½ miles long.

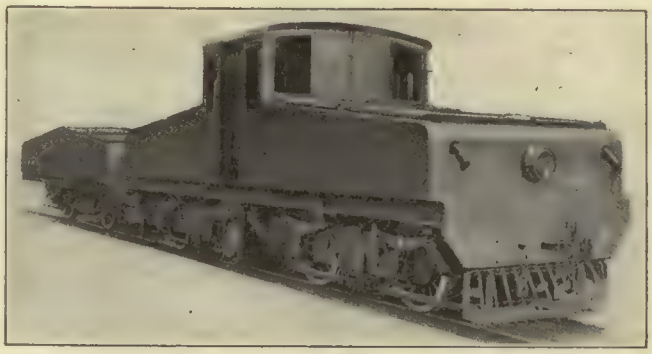
The maximum freight load to be hauled is 280 tons, and the weight of the passenger trains loaded is 128 tons. The service consists of four freight trains and one passenger train each day in each direction, but it is anticipated that this service will be greatly increased in the near future.

The railway is equipped with an overhead contact line, the contact wire being suspended from a double catenary outside the tunnel and a single catenary inside. The messenger wires are of copper and act as feeder cables also.

The locomotives weigh 48 tons and are built for the track gage of 3½ ft. They are 35 ft. 8 in. long over bumpers, and 7 ft. 6 in. wide over all. The truck wheelbase is 8 ft. 9 in. and the wheel diameter 3 ft. 9 in. The four motors have a combined capacity of 680 hp. at the one-hour rating, or 420 hp. continuously. The motors drive the axles through single-reduction spur gearing. They are permanently connected in series pairs. Four types of brake are provided: hand, straight air, automatic air and rheostatic. Provision is made for multiple-unit operation, the control being of the English Electric camshaft type.



Passenger and Freight Locomotive for New Zealand Electrification



Inspection and Repair Battery Locomotive with Battery Tender

A Centralized Store Department

THE purchasing and stores departments of the Detroit Municipal Railway are conducted on a somewhat different basis than on the average electric railway. All purchasing for the railway department, as well as for other city departments, is done through the city department of purchases and supplies, but the railway supply department conducts all follow-up work with the manufacturers of supplies, receives and stores the material, and attends to its distribution among the different departments of the railway.

The main storage yard is at the former track yards of the Detroit United Railway, at Harper and Mount Elliott streets, and this area of 10 acres has been laid out with four distributing tracks, each 800 ft. long. Material is loaded into and out of these yards by steam locomotive cranes, of which the department has two, one of 30 tons capacity and one of 20 tons capacity. The trolley on the four tracks is 40 ft. from the ground so as to be out of the way of the crane booms and is fitted with an over-running contact device and a lead wire which attaches to the street car trolley pole.

A track from the Michigan Central Railroad enters this yard to a ladder track which feeds the four mentioned storage tracks. Plans for a central storehouse are under consideration.

In addition to the duties of storekeeping, the stores department in Detroit also does all the hauling of coal and ashes for the other departments, even including the hauling of ashes for the power department, and rails, paving materials, etc., for the construction gangs of the track department. For this purpose it has six locomotives and fifteen flat cars and will shortly add to this equipment two Differential motor cars and two Differential trail cars. It has its own crews for the operation of these cars, and they work on three shifts to insure twenty-four-hour service. Mounted in the cab of every locomotive is a map of the system so that these cars can go to any point in the minimum time.

An important part of the work of these trains and of the department as a whole is the collection, sorting and sale of scrap. A classification for scrap with eighteen main heads, each having two or more subheads, has been worked out. These classes are based upon a study of the kinds of scrap which can be sold at the best terms direct to the user rather than through a middleman.

The Readers' Forum

Sixty Weeks of Pass Riding

TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY
TERRE HAUTE, IND., June 21, 1923.

To the Editors:

Being now in the sixtieth week of the use of the unlimited ride, weekly pass, and having therefore accumulated some experience, I read with considerable interest the article in your June 2 issue, entitled "Why the Unlimited Pass Was Withdrawn in Youngstown."

Without doubt there were plenty of good and sufficient reasons for the action taken by our good friends in Youngstown, but it seems to me that there were several arguments used in your article which might be taken as general arguments against the use of the pass, not alone in Youngstown, but elsewhere.

As far as we are concerned, we introduced the pass so as to stimulate the riding habit, as we believed that this could be done without increasing the service. In other words, we wished to create more riding during the non-rush hours. Then, too, we sought to make regular riders out of those who had been doing some riding on the cars and some in the jitneys, figuring that if a man paid a dollar in advance for a pass he would become a regular rider. Furthermore, we figured that the pass had a good will value, which, of course, we were not able to calculate. All of our objectives have been realized during the period in which the pass has been used, namely, since May 1, 1922.

With us, the customer has to pay for twenty rides in advance, and therefore our pass sales would naturally be relatively low—at least, considerably lower than where the passenger pays for only thirteen or fifteen rides in advance; and yet it is our experience that many people do buy the pass from the standpoint of pure convenience. For instance, not so very long ago a salesman bought a pass at our office on Saturday morning, and insisted on purchasing it, despite the fact that he was in town for only that day, for, as he said, he expected to do enough riding which, plus the convenience of not having to make change, etc., would justify his buying it.

Under a system of this kind, it needs no argument to show that some people will get an extraordinary use of the cars at a very low rate; but that does not prove that every pass buyer will do the same thing, nor does experience show it to be true. There are exceptional cases, like the boy who is said in Youngstown to have ridden eighty times a day on a pass. If you analyze this statement and figure the time taken for each ride as only five minutes, this boy would be spending 400 minutes either riding on a car or waiting for a car to come along. If, now that the pass has been withdrawn, this same boy rides eighty times a day at regular fare, of course the argument is good; otherwise, it seems to me that it is not.

We are not disturbed in the slightest degree by a few exceptional cases so long as the results which we set out to obtain are realized. If the pass brings in more gross and more net, it stands to reason that it is a good system. If it did not increase the gross, and did not increase the net, the converse would be true. I was especially puzzled by the statement in the article that the street railway commissioner believed the pass to be economically unsound. To me, from the very beginning, the weekly pass has seemed to be, first and last, the most responsive to the economic law of any system of fares that has ever been devised, because it at once furnishes automatically a reduced rate to those who, in the nature of their goings about, have use for the street cars more than twenty times a week. A reduced rate for tickets purchased in quantity may be taken advantage of by the man who is least entitled to a reduced rate, simply because he has the money to invest at the time of purchase, but the system of selling the pass for $1 a week takes care of this.

Having used the pass system on our lines for more than a year, we are able to get a comparison of the workings of the system, this year versus last. This shows that during the first six weeks of the second year of the pass, while the passes sold decreased 1.5 per cent, the actual rides taken on the passes decreased 9.1 per cent. It was our observation that during the first month or two that the pass was in use a good deal of extra riding was done, until perhaps the novelty wore off and the system settled down to a utility basis.

There are other points upon which I might touch, namely, that the pass revenue is the most constant portion of the total revenue, and therefore it may be regarded as a stabilizer; and this is so because it represents income from the heads of families and the generally thrifty class in the community.

However, I did not set out to enter into a lengthy argument on this subject, and while being most ready to admit that there may and must have been many good and sufficient local reasons for discontinuing the pass at Youngstown, still those should not be used as arguments against the efficacy of the pass in general.

E. M. WALKER, General Manager.

Safety Zone with Permanent Posts

A NEW type of safety platform, or more properly speaking safety zone, is being tried in Detroit at the corner of Woodward Avenue and Park Street, or at the southerly side of the Grand Circus. It consists, as shown, of a series of iron posts planted solidly in the pavement, with about 4 ft. of post exposed. The posts



New Type of Safety Area in Detroit

are placed about 8 ft. apart. Altogether there are twelve of these posts parallel to the tracks and one post at right angles at each end, making fourteen altogether, as two-car trains are run on this route. There is a lamppost at each end of the safety zone. The one in

the direction of oncoming traffic, or that shown in the view, is inside the safety area. The light at the other end is just outside the safety zone. The posts are connected by chains except for two openings, as shown in the view.

This type of safety zone has the advantage that it does not interfere with the removal of snow in winter as much as a raised platform. At the same time it is more substantial than the surface type of safety zone, made by removable posts set on heavy iron bases.

This safety platform area was installed by the Police Department of the city of Detroit.

Interborough Augmenting Boiler Equipment

THE Interborough Rapid Transit Company, New York City, is extending its steam-generating equipment at its Fifty-ninth Street station. Four 12,000-sq.ft. Babcock & Wilcox boilers, four Taylor underfeed stokers and four Sturtevant fans for forced and induced draft service are being added.

The boilers, two of which will be in place this summer and two early in 1924, will be designed for 350 lb. pressure, but will operate for the present at 220 lb. gage and an approximate total temperature of 600 deg. F. One boiler will be fitted with a Foster radiant-heat superheater.

The stokers will be of the seven-retort type, thirty-seven tuyères in length, the longest Taylor stokers yet built. The furnaces will be approximately 12 ft. wide by 17 ft. deep. This special design was necessitated by the existing steel structure of the plant. The stokers will be driven by variable-speed motor.

One forced and one induced-draft fan, motor-driven, will be installed for each two boilers. Economizers will not be installed at the present time, but provision will be made for them should operating conditions warrant their installation.

To take care of the change in heat balance brought about by the installation of motor-driven auxiliaries instead of steam as in the present equipment, steam will be bled from a low-pressure stage of the main turbine units.

Association News & Discussions

The Outsider's View of What Sells Transportation*

"Almost Any Concern That Starts Out with the Rendering of Real Service to Its Patrons as an Actual Creed Can Hardly Escape Overwhelming Success"

BY EDWARD HUNGERFORD

A MERCHANT'S show window should be one of his chief trade assets. He will tell you, himself, that it should be of greatest value in helping the merchandising of his wares.

I sometimes wonder how many railroad men ever think of this point. I am not referring specifically to the street railway men in this remark. In fact, I am rather inclined to a belief that in recent years they have given more attention to this phase of their problem than have most of their steam railroad brethren. The passenger trains of the average American railroad—even the so-called de luxe or limited trains—give but little external evidence of a real desire to sell their product. Internally no important progress or achievement in the high-grade American passenger train has come to pass since the creation of the wide vestibule and the observation platform.

Yet it is not even at this that I am inclined to cavil. For the moment it is rather at the outward appearance of the trains.

They have been standardized—standardized to the death, I am inclined to say. The so-called Pullman green has been made the ruling color for the exterior of the passenger trains of nine-tenths of the rail mileage of the United States. That is, it is green at the beginning; after a few months of wear upon the road it becomes a dingy neutral black, sordid and forlorn.

Up to a few years ago some of the roads attempted to relieve this forlorn monotony of their passenger equipment by striping their coaches with fine, bright gold lines. But along came standardization and ordered off the stripings; the American passenger car became as dull and as stupid in appearance as the box car; more so, in fact. Various railroads have sought boldly to place their gay individual trade marks upon the sides of their box cars. But for some reason, utterly inexplicable to me, the sides of the passenger cars have remained sacrosanct. No one has dared to use them for dignified exploitation. Standardization seemingly is a pretty cruel sort of a god.

Now, I have no particular quarrel with standardization. In fact, I have a great deal of real admiration for it. In the mechanical, in the operating, in the financial ends of a railroad it accomplishes marvels. But standardization has no place whatsoever in the exploitation of a railroad—in the delicate business, if you please, of merchandising its transportation.

Will those of you who have been overseas contrast the outward appearance of the American railroad train with that of its British cousin. The passenger train in Great Britain is a thing of beauty and a joy forever. Not only is it bright, gaily striped and immaculate, but in almost every case the coat-of-arms of the operating company is brilliantly emblazoned upon each passenger coach.

A coat-of-arms for a railway company? Well, why not? Not for our American railways—steam or electric—the British type of coat-of-arms, aping monarchial traditions in its composition, but a coat of arms distinctly American; like the swastika of the Santa Fé or the Glacier Park emblem of the Great Northern. Both of these are as American as they could possibly be. Each is thoroughly distinctive. Each registers, without a printed word alongside, the name of the great railroad that it represents.

So far I have talked of the steam railroad, chiefly. Yet everything that has been said of it here and now applies with equal, if not with greater force to the electric line. Recently some of our electric roads have begun to see the light on this thing. A year or more ago, my good friend, T. C. Cherry began painting his Rochester-Syracuse interurbans a bright, gay, beautiful orange—a bit of collegiate fidelity to an alma mater in that, I think—and we

*Address made before New York Electric Railway Association, Bluff Point, N. Y., June 23, 1923.

Rochester folk awoke to the fact that there still was an electric railroad running between our town and the city of the saline marshes. Recently the Interborough in New York city has done Cherry the high honor of copying his color scheme, and some of the older New Yorkers realize once more that their elevated railroad is again in operation.

A small point? Not a bit of it. It is a very large point, and if I were even to attempt to lead you into its ramifications we should have to take a short course in psychology this hot June day—and that is a field into which I have no intention of leading you at this time.

It is a large point because it is a large factor in the successful merchandising of transportation. The Interborough says that it can already see good results from its step in selling enterprise. And I can aver that the Rochester-Syracuse trolley has also made a new impress upon the largest of the communities that it is trying, so faithfully and so honestly, to serve.

The outside world—the potential market, you might wish to put it—of the street railway has no deep-seated or inborn grudge against it. In fact, I often doubt if the sentiment for lowered fares which is so ingeniously engineered against it, has much real response in the heart of the average man. If he is like me he is vastly more concerned in the quality of the service that is to be rendered than in the fine shadings of the price. I am not a rich man. But for a street railroad to be of any service whatsoever to me, it must first begin to serve me.

Railway Loses by Infrequent Service

We have in Rochester, generally speaking, an excellent street railway system. Its cars are clean and modern and, being kept brightly painted, are good show windows of its transportation product. Its men apparently are careful, are courteous and seemingly most efficient. If the road has failed anywhere, it has failed in properly selling itself to the community. Which is an intricate thing into which I shall not enter now. In the rush hours the local system seems to meet its peakloads with a great deal of real efficiency. It is in the non rush-hours that its service is apt to fall to a point where the street railway ceases to be of the largest degree of real service to many folk in our community.

Undoubtedly the records of the company will show that its cars in the non-rush hours are not filled even to their seating capacity. With this there can be no quarrel. And still the statement may be made honestly that the company is not rendering the proper non-rush-hour service. Let me illustrate by personal experience.

My office is three-quarters of a mile from my house—a little less in fact. A double-track trolley line connects them. If I go out to the corner and catch a car—all well and a good. The street railway has my 7 cents and it is welcome to it. It is giving me good value for my money. But if I miss a car, I shall have to wait ten minutes for another. In less than that time I can, and do, walk to my office, and pocket the 7 cents. That 7 cents is lost to the Rochester system for all time.

When I go downtown at lunch the distance is a trifle too long to be walked swiftly and again I ride—when a car is in sight. But if I have just missed one, I again walk, easily beating the following car, and another 7 cents is lost.

My average daily riding, aside from that of the members of my family, comes to six rides; on tickets, about 40 cents. This fall I am going to buy a small closed car. It will not cost me much more to maintain than my car-fare expense — particularly when I count in the riding of my family—and I shall no longer have to stand around on street corners waiting on the ten-minute interval. I am buying the car on the advice of several of my neighbors who say that they have been forced, for the same reasons, into the purchase of closed cars for winter use. Potentially they prefer, as I prefer, the street car. It is bright, warm, clean, and there is no risk or responsibility in riding in it. But their time is far too valuable for them to wait upon a ten minute headway.

Here, then, is a street railway, in almost every way highly efficient, failing in one important way to sell itself to the most profitable form of possible patron—the short-haul rider. I do not have to tell you gentlemen that he is the cream of your traffic. Nor do I have to suggest that if you leave him too entirely out of your reckoning you are missing a very good potential source of revenue.

How to Sell Transportation

There are, of course, many ways for a street railway to sell its transportation. One of the most important of these is, in my opinion, the seating arrangement. The average rider, and this is particularly true if he is going any real distance whatsoever, does not like a longitudinal seated car. The cross-bench seat—even if it does detract appreciably from the standing capacity of the vehicle—is the seat that he wants, in nine cases out of ten. Therefore why not aim to give it to him?

Putting the thing the other way around, why fret his soul with awkward or uncomfortable seats, with turnstiles and other similar devices and then expect his undying affection and support? After all, your patron is but human. He likes his motor car, because it seats him the way that he wishes to be seated. How many motor cars do you think that Henry Ford would be making each twenty-four hours if he had them rigged with longitudinal seats? Or if a man had to clamber through a turnstile to get into one of them?

Personally, if they ever put turnstiles on the cars that run by my house, I simply will cease to patronize those cars. I say this without feeling, without prejudice. If the street railway can get along without my patronage or that of my family, why that is its own business—up to a certain point at least. But I do think that the time is not so very far distant when those of us to whom it has failed to sell its transportation will come to sufficient numbers and sufficient volume that we will represent a distinct lack of revenue. It would be well for the railway if it stopped somewhere short of that point.

Enough for the negative side of this thing. Now consider, if you will, the positive side for a final moment. Last October when I had the great pleasure and honor of attending your national meeting in Chicago I also had a great joy in studying out the workings of the interurban trolley between that city and Milwaukee, 85 miles to the north. Gradually there was unfolded to me one of the most interesting transportation stories that has ever come to me. A debilitated, bankrupt, almost hopeless interurban trolley had been fanned back, not merely to life, but to something that dangerously approached being a howling success. Selling its transportation, it had come to a point where it had gained for itself, right under the very noses of two of the best operated and most alert passenger railroads in America, 68 per cent of the local riding between Chicago and Milwaukee.

How was that done?

It is too long a story to be told in detail here. Let me say, however, that it was not done by the installation of cars that were dirty, unkempt, uncomfortably seated or equipped with cumbersome passenger regulatory devices. The equipment of the trains, terminal stations, cars, all the rest of it was planned with a definite view to satisfying the necessities, the comforts, and even the whimsical desires of the passenger. That is what we call rendering service. It is my firm belief, gentlemen, that almost any concern that starts out with the rendering of a real service to its patrons as an actual creed can hardly escape overwhelming success. If its heart is in the right place its bank balance generally finds the same path.

This is the test by which we are today beginning to measure our steam railroads. Long ago we applied it to our retail stores, our newspapers, our hotels, our theaters, to all the business that come into infinitely many contacts with their public. Those that met the test have survived—and survived brilliantly, almost without exception. The street railway cannot claim immunity from such a test. On the contrary, it should be seeking it out, with pride and with dignity. It should be asking itself, all the while:

"Are we meeting, as fully as possible, the service needs of our community? Are we doing all that we possibly can do to give the largest measure of passenger transport to the town or the towns that we serve?"

That is what I mean by selling transportation.

The painting and the cleaning of the cars, the adjustment of fares, the inclusion of clever ride-selling devices such as the ingenious weekly pass, newspaper and poster advertising, the arrangement of the seats, even the abolition of the sin-filled turnstile, are each in its own way, good steps in selling transportation. But the final step, the last measure, the full test of transportation salesmanship is in the hearts and souls of the men who actually conduct the properties. They know—and only they can ever know—whether they are rendering the fullest measure of transportation service to their communities; and so whether they are attaining the highest measure of salesmanship for their peculiar product of transportation.

New Yorkers Gather at Bluff Point

One-Day Meeting Given Over to Business Discussion in the Morning, Golf and Water Sports in the Afternoon, and a Banquet in the Evening—Keeping Employees Happy, Selling Transportation, Publicity and the Bus Were Subjects of Addresses

EMPLOYEE relations, selling transportation, publicity, and the place of the bus were the subjects considered in four addresses before the New York Electric Railway Association at Bluff Point, N. Y., on Saturday, June 23. The meeting was well attended and was presided over by President B. E. Tilton, vice-president New York State Railways, Syracuse lines, who also acted as toastmaster at the evening banquet.

At the morning session particular interest centered in the addresses by James E. Kavanagh, vice-president Metropolitan Life Insurance Company, New York, on "Industrial Relations, Unemployment Compensation, and Old Age Pensions," and by Edward Hungerford, Rochester, N. Y., on "The Outsider's View of Selling Transportation." W. Dwight Burroughs, publicity agent United Railways & Electric Company of Baltimore, entertained the audience and also gave it some thoughts to take home on how to tell the electric railway story to Bill Jones.

A paper by W. B. Potter, engineer, railway engineering department, General Electric Company, on "Co-ordinating Bus and Trackless Trolley Transportation with Electric Railway Service," was read in Mr. Potter's absence by H. L. Andrews. This paper discussed in a general way the relative economy of the different types of vehicles and pointed out the field of each from the economic standpoint.

At the close of the morning session W. H. Collins, Gloversville, N. Y., as chairman, presented the report of the nominating committee, which was unanimously adopted by the association, electing the following officers for the ensuing year:

President, Edwin Duffey, president Cortland County Traction Company, Cortland, N. Y.; first vice-president, Clinton E. Morgan, vice-president and general manager Brooklyn City Railroad; second vice-president, William J. Harvie, vice-president Auburn & Syracuse Electric Railroad, Syracuse; secretary-treasurer, William F. Stanton, Rochester, N. Y.

Keeping Employees Happy

Mr. Kavanagh, in his address, said that in many companies there is no program of "humanics," as compared to the program of mechanics which is usually very thoroughly carried out. He drew upon the experience of his own company, the Metropolitan Life Insurance Company, to show what might be done along this line. His company got into this matter fifteen or twenty years back in scheming out ways looking toward greater stability of employment. It was considered that employees' interests were four-sided—intellectual, social, financial and physical. It was undertaken to do things which would enhance these interests.

In order to insure employees fit physically, the first step is that the company engages only those who are in good health. After an employee is hired, the company considers it its duty to keep him healthy. This is accomplished by maintaining good working conditions, by insisting upon a physical examination at least once a year or oftener if it is thought one is needed, examination of teeth twice a year, provision of a gymnasium with a physical instructor, and various meets and teams which give impetus to the athletic program. Luncheon is also provided free every day to all employees, because it is believed to be a good economy. The company considers that it gets a thank-you every day and that this is better than an increase in salary because that means only one thank-you and then it is forgotten. It is also felt that it is better to supply luncheons than to put this money in the pay envelope as it pays better returns.

In developing the intellectual side of the employee, effort is made to keep his mind busy. He must be given something to occupy his mind aside from his work. If the employer does not do this, some one else will. Consequently the Metropolitan company has devised every kind of class any one can be interested in, including French, stenography, millinery, dressmaking, actuarial studies, art clubs, etc. A large proportion of the employees takes part in some of these courses. The company provides a library of 50,000 volumes, and employees are induced to read by a friendly appeal to their ambitions and a close follow-up by the librarian. Every employee outside of the main office is required to take the company's correspondence courses. These formerly were optional but are now required.

The social or recreational side is taken care of by the employment of certain people whose entire job is to provide fun for the employees. This comprises dancing, picnics, athletic meets, special parties in recognition of long periods of service, etc.

The financial side is developed by getting employees to save money. This is often done by appealing to their sentiments, as they will do things for their families that they will not do for themselves. The company takes pains to let everybody know how much John Doe has made since he came to the Metropolitan. The program in this direction has resulted in a general impression throughout the company that everybody with the Metropolitan gets rich, and Mr. Kavanagh said that this is about 90 per cent true.

The speaker pointed out that the average employee has five worries: What will happen to him or his family if he should (1) get sick, (2) have a bad accident, (3) be out of a job, (4) become aged, (5) die. It should be the employer's interest to remove these worries. The first two and the fifth are taken care of through life, health and accident insurance.

In the matter of old age, there is a large tendency to provide pensions for faithful employees. Many plans are in effect, but many are very unsatisfactory. They carry an implied peonage. Employees feel that they have to work all their life for this one company in order to get pensioned. The young man does not value it because it is too far removed from his immediate need. There is also the skepticism resulting from association of the pension fund with the corporation fund. If the company should fail or if there should be a change in management, or if the corporation merged with another, the continuance of the pension plan is somewhat uncertain. Furthermore, there is an indeterminate and constantly increasing cost which becomes very burdensome as time goes on, as it takes fifty years to get the maximum effect of the average pension plan.

Most of these objections to pension plans are overcome by the more modern pay-as-you-go plan, whereby the company contributes year by year a certain percentage of the payroll to take care of "retirement certificates," which are handed to the employee each year. This plan gives each employee a bond year by year, which is free from all strings and which he can put away against his old age disabilities. Mr. Kavanagh stated that a pension scheme granting reasonable benefits to retiring employees, based on contributions which employees are perfectly willing to pay, can be worked out at a cost to the employer of between 1 and 2 per cent of his current payroll. On this plan the pension does not depend upon the employee reaching the pension status in the employ of one firm. A delivery of the certificates to employees each year rouses the interest of the young man. The cost of the plan within reasonable limits can be determined many years

in advance. It avoids the feeling of paternalism, since the employee has in large measure himself paid the cost of his pension protection.

Mr. Kavanagh also mentioned the possibility of unemployment insurance, which is now getting the attention of some concerns. He said that the Delaware & Hudson Railroad pays $15 a week to an employee upon his discharge for a period of six weeks maximum, or up to the time of his employment on another job. Because they know it may cost the company six weeks pension, or $90, when they fire a man, foremen are more inclined to make a real effort to put the man on another job where he may fit rather than to fire him without consideration.

An interesting side light of the plan is that on this particular railroad it has been found that there is an increase of 20 per cent and a decrease of 10 or 12 per cent representing the maximum fluctuations from normal number of employees. Thus it may be possible to work out a plan whereby the increased amount of work at any time would be taken up by increasing the length of the working day up to ten hours before employing additional men.

DON'T EDUCATE BILL JONES

In pointing out how to tell the electric railway story to Bill Jones, Mr. Burroughs defined who Bill Jones is and what he reads as an average American citizen. He said not to attempt to educate Bill Jones, that he does not like history, but enjoys a story. Mr. Burroughs then went on to show how stories of the railway have been told in Baltimore, largely through the use of still pictures. One picture lecture showed how the growth of the railway had been the growth of the city. In another, when it was desired to talk transfers, the subject matter was directed to "corners" of Baltimore and of various cities. The number of free transfers given at these corners was finally brought up in this story and the height of a stack of transfers issued in one year compared with the height of the highest mountain in the world, the transfer stack being much higher. In making such comparisons, Mr. Burroughs said that it had been the practice to give the rule by which the comparison was made, so that Bill Jones could check for himself the comparison, without taking the company's word.

These picture stories have been presented at various exhibits with an automatic stereopticon machine. People have shown a good deal of interest in them, and have asked to have the pictures brought up to their church, or lodge, etc. This has given the company a great many opportunities to tell its story. A circular was also sent to the clubs, schools, libraries, telling the subjects of these pictures, and a great many calls result from that. Mr. Burroughs' particular admonition was as follows:

"Don't educate. Don't talk high brow. If you talk low brow, the high brow will get it, but if you talk high brow you will lose most of your audience."

After the reading of Mr. Potter's paper on the place of the bus, a question was raised as to the cost of bus operation. Zenas W. Carter of the White Company, said that no two men operating buses have the same costs. The operating conditions vary materially and the costs with them. He considered, however, that it is impossible to give a service beyond a 2-mile haul for a 5 cent fare, and that in general it is necessary to charge 10 cents. Between Youngstown, Ohio, and Warren, Pa., the Pennsylvania-Ohio Electric Company is operating a bus and charging 3 cents a mile and making a large profit. The Youngstown & Suburban Railway is charging 3½ cents a mile for its bus service. Mr. Carter considered that the thing to do was to give good service and charge for it accordingly. Bus service is not comparable to rail transportation, and it is necessary to get more money for it. It is a new type of transportation which the public demands and which it must pay for on a different basis from railway service.

Prince of Wales Becomes President of Institute of Transport

AT THE dinner of the Institute of Transport, held at the Savoy Hotel, London, on May 3, it was announced that H.R.H. the Prince of Wales, K.G., K.T., had agreed to become honorary president of the Institute. In this position he succeeds the Right Honorable Lord Ashfield, chairman of the Board of the London Underground Electric Railways Company.

The president of the Institute, Sir Sam Fay, in making this announcement, said that the Institute was in its infancy and in his opinion must assuredly grow with the heir to the throne as its honorary president.

The Institute of Transport was established on Nov. 3, 1919, and since then a number of important papers on city transit have been presented before it. At its congress, which was to be held at Sheffield, June 13 to 16, a number of such papers were scheduled, with inspection of the Hadfields' special work plant, and a paper on modern track work by Sir Robert A. Hadfield.

C.E.R.A. Summer Meeting

THE program for the summer meeting of the Central Electric Railway Association on July 18, 19, and 20 at the Breakers Hotel, Cedar Point, Ohio, has been arranged as follows:

Wednesday morning, July 18, at 10 o'clock there will be a meeting of the executive committee. The convention will convene at 11 o'clock, when President James P. Barnes will make his address. Reports of committees and of the secretary will consume the remainder of the morning.

Wednesday afternoon at 2 o'clock there will be a paper on "The Interurban Possibilities from Freight Business," by T. H. Stoffel, Westinghouse Electric & Manufacturing Company. Secretary Earlywine states that a great deal of interest will be manifested in this paper, as it is the result of an exhaustive study of the freight situation in the central states. The prevailing handicaps which now exist will be pointed out, presumably with suggestions for future developments.

Thursday morning at 10 o'clock, H. L. Andrews, General Electric Company, will present a paper on "What Manufacturers Have Done for the Electric Railway Industry." There will also be another paper at this session on "Utility Information Work," by John Mellett.

Thursday afternoon, 1:30 o'clock, the Engineering Council will convene with F. R. Coates presiding. In this session devoted to the Engineering Council, addresses by the directors of the four local sections and the reports of three committees will bring before the association all the subjects discussed by the Council prior to Jan. 1, 1923. These subjects will come before the association in the nature of recommendations for standardizing equipment and practices. These recommendations will represent the combined activities of the four sections and mark the beginning of a permanent record of approved methods and practices on engineering subjects as endorsed by the association. Papers will be presented as follows:

"Purpose of the Engineering Council," by R. Moses, Youngstown, Ohio, director Eastern section.

"Support Deserved by the Engineering Council," by A. V. Brown, Sandusky, Ohio, director Northern Section.

"Benefit of the Engineering Council to the Railway Industry," by L. A. Mitchell, Anderson, Ind., director Western section.

"Future of the Engineering Council," by G. A. Stiles, Columbus, Ohio, director Southern section.

Report of the committee on track and roadway, by T. H. David, Indianapolis, Ind.

Report of committee on power supply and transmission, by G. H. Kelsay, Elyria, Ohio.

Report of committee on car equipment, by P. V. C. See, Akron, Ohio.

"Wireless and Its Application for Communication by Electric Railways and Central Stations," by C. A. Boddie, Westinghouse Electric & Manufacturing Company.

"Steel Ties," by William P. Day, president International Steel Tie Company.

Thursday evening at 6:30 o'clock, there will be an informal dinner for association members and invited guests.

Friday morning at 10 o'clock E. F. Wickwire, secretary Ohio Brass Company, will address the convention, on co-operation of manufacturers with the

railways. After discussion of this paper and transaction of further business, the convention will adjourn at noon on July 20.

A special car furnished by the Interstate Public Service Company will leave Indianapolis at 7 a. m. on July 17 and arrive in Sandusky at 5:30 p. m.

The Engineer as a Leader in Transportation

The Ever-Widening Scope of Engineering Is Discussed at the Annual Convention of the Society for the Promotion of Engineering Education

THE story of the railroads of this country is a story of the engineer, according to E. H. Lee, vice-president and chief engineer Chicago & Northern Indiana Railroad, speaking at the annual convention of the Society for the Promotion of Engineering Education. He divided the history of the railroads into three periods: the construction period, the transition period, and the public relations period. Railroad construction was romantic and drew men of brains and ability. With no data and meager tools the engineer built the roads, made bridges and filled in the swamps. At that time the engineer was not considered a real leader in transportation, but only a necessary evil.

As railroad traffic developed during the transition period, the systems had to be improved and freight movement speeded up. Public sentiment was not so favorable to the roads at this time as it had been in the construction period. The chief reason for this change was that the real leader who had done the impossible with the physical problems was not interested or competent to handle the political, financial and human problems which were developing.

In the present or third period the question of public relations and human relations has become paramount in the successful operation of transportation systems. The ideal is to secure the best possible service under conditions which shall be the best possible for all concerned in the operation of railroads. The engineer's work has become increasingly important, not only in design and construction but also in operation. The tendency now is to advance engineers to positions of leadership. He must bring to the problem of the present period, however, the same ability and energy with which he solved the problem of the construction period and later those of the development.

The meeting was opened by an address from Dean Dexter S. Kimball, Cornell, who stated that twenty years ago the idea of a course of training for leadership was startling, but that now this topic was of major interest. Before the development of electrical engineering to its present position of importance, engineers were designers and builders. Technical requirements, however, governed the manufacture of electrical apparatus so greatly that engineers have been forced to enter the shops as managers. The same sort of development has occurred in salesmanship, technical engineers now being in demand to sell scientific equipment. The business world, according to Dean Kimball, now desires and admires the engineering way of doing things so greatly that the engineer will soon reign supreme in designing, operation and management of industry. The military leader of days gone by no longer exists, and his place has been taken by the man with legal training. The leader of the future, however, will be the engineer, because the public has confidence in his methods.

The president of the society, Prof. Charles S. Scott, Yale, told of the encouraging co-operation which had been received. A paper was read by T. H. MacDonald, chief of the Bureau of Public Roads, Washington, D. C., on "The Engineer as a Leader in Public Service." The result of the work of a joint conference committee to determine the place of the engineer in industry was presented by O. S. Lyford of the National Industrial Conference Board. He said the three important questions are: 1. Does industry need more or fewer engineers than are now available? 2. What kind of education should they have? 3. What is the responsibility of the industry in their work? He emphasized the point that the engineer should be a leader, because he has a method of attack and a scientific mind. Industry considered the underlying scientific training of the engineer to be fundamental. A man who has a scientific mind will generally receive the best education from a course of engineering, regardless of the work he intends to pursue.

"The Engineer in Business" was the subject of a talk by W. E. Wickenden. The place of the engineer as a leader in business is not assured, he thought, although the engineer's leadership in industry is certain. The business world, however, is dominated by considerations which are a handicap to engineers.

Program of the International Strassenbahn Verein

THE program for the second annual convention of the Internationale Strassenbahn und Kleinbahn Verein, with headquarters at Vienna, has just been published. It follows:

"One-man Cars," by Mr. Van Putten, Amsterdam Municipal Tramways and Mr. Hultman, Malmö Tramways.

"Track Construction and Track Maintenance," by Mr. Goetz, Leipzig Street Railway.

"Motor Control Systems," by Mr. Pforr, Berlin Street Railway.

"Average Annual Output in Car-Miles of the Train Force, when Working on the Basis of the Eight-Hour Day," by Mr. Mumssen, Hamburg Elevated Railway; Mr. Norregaard, Copenhagen Tramways, and Dr. Patz, Budapest Electric Railway.

"Design of Modern Street Railway Motors, Including Methods of Lubrication," by Mr. Wellner of the Bielitz Electrical Works.

"Anti-Friction Bearings and Lubrication of Bearings and Gears," by Mr. Pforte, Hagen Street Railway, and Doctor Videky, Budapest Institute of Technology.

"Magnetic Brakes," by Mr. Barth, Kristiania Street Railway.

"Fare Systems in Restricted City Areas," by Mr. Winter, Vienna Municipal Railway.

"Recent Improvements in the Zurich Street Railway System," by Mr. Wick, Zurich Municipal Railway.

"Car Couplings," by Mr. Paap, Berlin.

"Standardized Practice in Car Design on Standard and Narrow-Gage Steam Railroads," by Mr. Semke, Berlin.

The date and place of the next convention has not yet been settled. An invitation has been received from Münich to meet in that city during the spring of 1924.

Organization Meeting — A.E.S.C. Sectional Committee on Walkway Surfaces

THE first meeting of the sectional committee on walkway surfaces of the American Engineering Standards Committee was held on June 15 at the Engineering Societies' building in New York City. This committee has been organized under the dual sponsorship of the American Society of Safety Engineers and the American Institute of Architects.

The committee organized by electing the following permanent officers: Chairman, Dr. Lucien W. Chaney, U. S. Department of Labor; vice-chairman, F. W. Joannes, American Institute of Architects, and secretary, H. W. Mowery, American Society of Safety Engineers. An executive committee of seven members, including the three officers, was also elected, and a committee on plan and scope was appointed.

The committee will undertake to promulgate a code covering the appropriate materials for walkway surfaces as applied to walks, floors, stairs, platforms, elevators, car steps, car floors, etc., all with the view of providing adequate specifications to cover the manufacture of such materials. It is believed that accident hazards may be greatly reduced by correct application of the code which will ultimately be formulated, possibly somewhat along the lines of results obtained through the National Safety Code.

That the electric railway industry is much interested in the work of the committee is shown by the fact that the code will be applicable to railway cars, stations and platforms and will specify characteristics for walkway surfaces to include, among other things, resistance to slipping, freedom from

the tripping hazard, durability and insulation for surfaces around electrical apparatus.

The American Electric Railway Association has been requested to name a representative on the committee but the representative has not been appointed as yet. R. C. Cram, Brooklyn, represented the association at the organization meeting.

Returns from a British Electrification

Good Results Shown in the Suburban Service of the London, Brighton & South Coast Railway by the Electric Trains as Compared with Steam

AT A MEETING of the Institute of Transport in London on May 7, 1923, Sir Philip Dawson, M.P., presented an address in which he gave some interesting figures on results with steam and electric traction in suburban service on the London, Brighton & South Coast Railway. Three of the charts presented by Sir Philip are reproduced. As the investigation was primarily to show what benefit might be expected from electrification, the "expenditure" charted indicates only the expenditure affected by the system of traction adopted. Hence, from the net receipts indicated in these charts, the cost of maintenance of track, management, taxes, etc., which are not directly affected by electric as compared with steam operation, should be deducted if the net amounts available for dividends are to be ascertained.

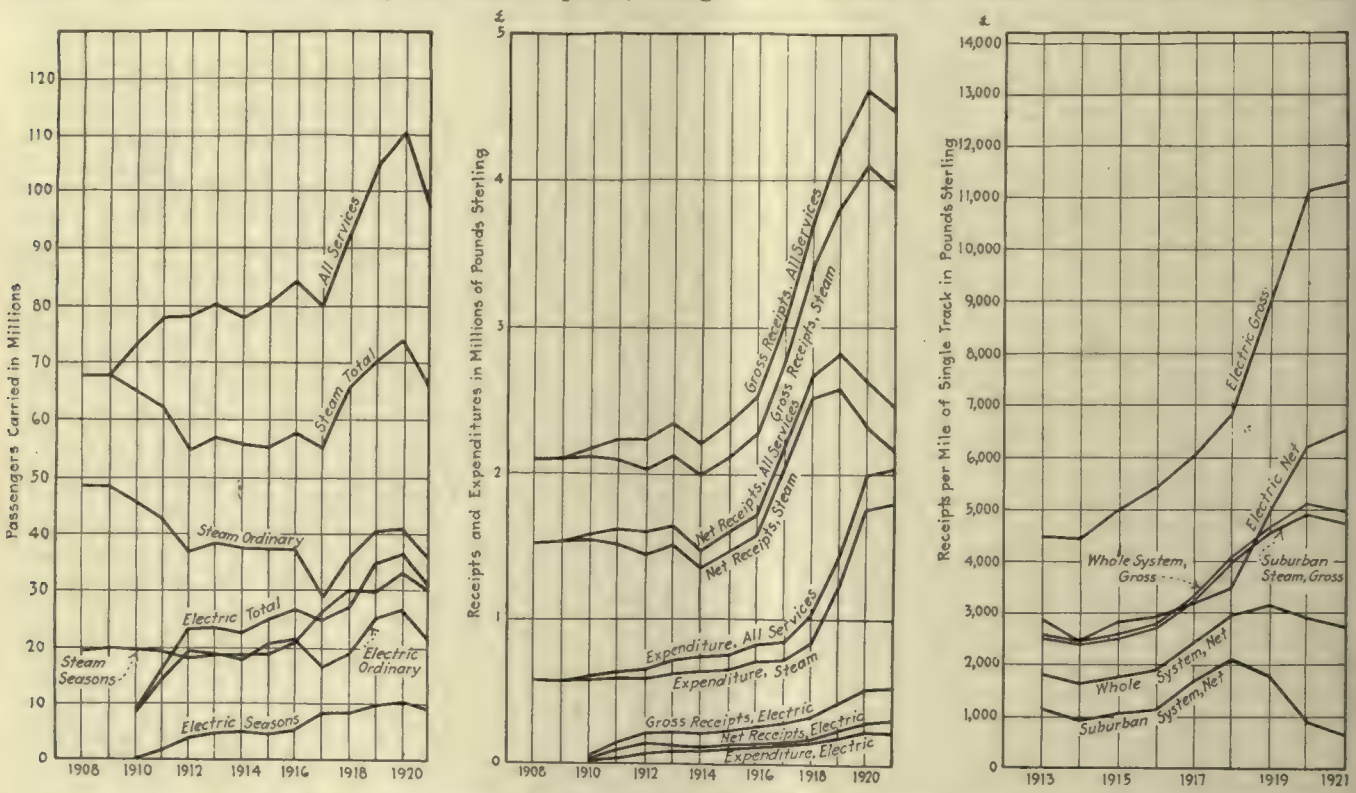
The electric division of the London, Brighton & South Coast Railway gives a suburban service only, and does not, according to the speaker, "represent the most profitable part of the railway system." Considerable suburban service is also given by steam. The average suburban steam train consists of 6.6 cars, accommodating 463 passengers and operating at an average speed of 9.31 m.p.h. The average electric train consists of 4.4 cars, accommodating 308 passengers and operating at an average speed of 21.8 m.p.h.

The first diagram shows that up to 1920 the passengers by electric trains constantly increased, while those by steam trains in 1921 are about the same as in 1909. The second diagram shows that gross and net receipts in the case of steam are decreasing, while the reverse is the case with the electric services. The third diagram shows the remarkable track capacity obtained with electric power, though as a certain number of suburban steam passenger trains operate over electrified sections and this mileage has not been taken into consideration, the suburban steam services show up more advantageously than they should.

In estimating the cost of equipping the entire line with electricity, the speaker said that if electrification would bring an increase of 70 per cent in gross receipts on the suburban line and 35 per cent on the main line, a return of 8¾ per cent could be made on the expenditure required to carry out the electrification, and that these estimates of increase in growth were conservative.

In the discussion which followed the presentation of this paper, Sir George Paish, the eminent statistician, declared that the terms used in the paper, "passengers per train-mile" and "passengers per car-mile" were misleading. There were no such units. Passenger mileage can be divided by train-miles or the number of passengers can be divided by number of trains, but number of passengers cannot be divided by train-miles. Sir Philip Dawson in his reply acknowledged the theoretical correctness of the criticism but said that as passenger mileage was a very difficult figure to obtain, the ratio used was employed as a matter of interest, and as between lines where the average length of ride is about the same, was a convenient one.

Sir William Acworth, director of the London Underground Railways and also author of various books on railway economics, suggested that the best way of deciding the "battle of the systems" was to toss a coin and then abide by the result. He said that if that had been done during the dispute between the advocates of the vacuum brake and the air brake in the early days, it would have been a good thing for the British railways. Another instance of the kind was the adoption of various railway gages in India. Sir Philip Dawson, however, pointed out that electrification was not quite the same thing as gages, because if, after a number of years, it was found advisable to alter or modify the electric system it could be done at a comparatively small cost compared with the cost of unifying different gages.

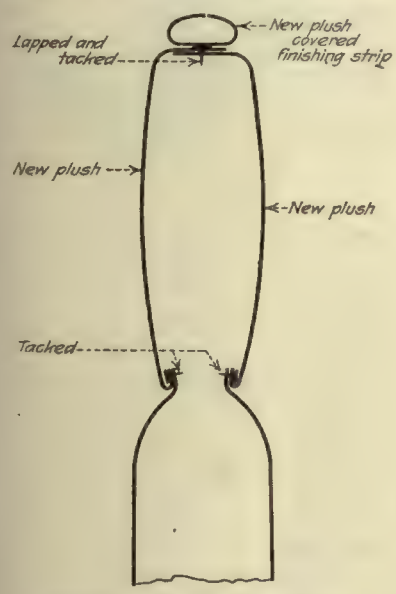


Comparative Results of Steam and Electric Traction on Suburban Lines of the London, Brighton & South Coast Railway

Maintenance of Equipment

Economical Method of Covering Seat Head Rolls

WHERE plush covering is used on car seats, the head rolls at the top of the seat backs become greasy from the hair of passengers and so are very unsightly. This grease is of such a nature that its removal by any of the various commercial cleaners is almost impossible, and about the only satisfactory method is to re-cover the soiled parts. As plush covering is expensive, the replacement with new material is costly unless the material is used economically. The accompanying illustration shows a plan used by the Lehigh Valley Transit Company, Allentown Pa., in which new plush is placed over the old head-roll covering without disturbing it. In starting strips of plush are placed with their face against the lower part of the seat back. The upper edges are then tacked along the depression. The back and front strips are then folded over the heads of the tacks and brought together at the top of the seats so as to overlap. Here they are again tacked, and a finishing strip is nailed over the top. This strip is covered with a plush sleeve.



Method of Covering Head Rolls of Seat Backs

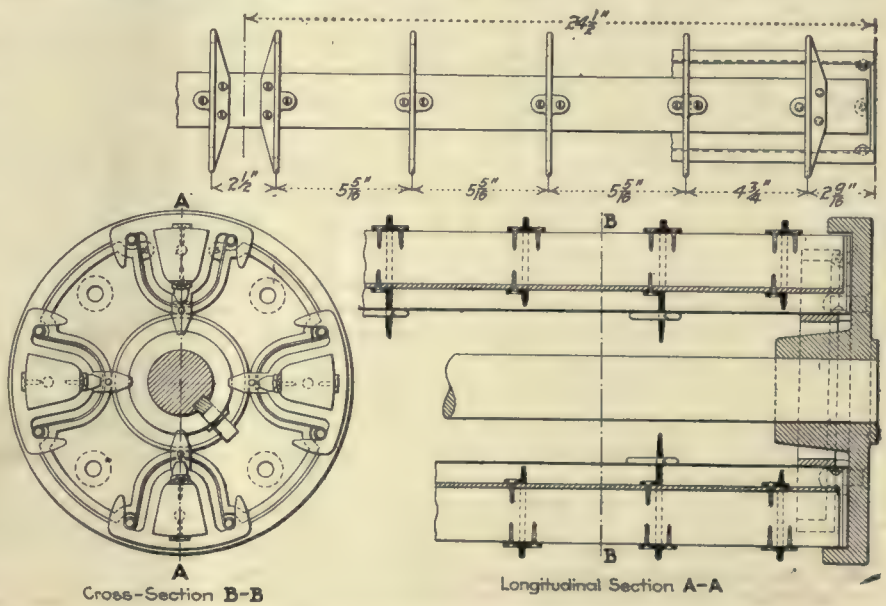
By this method no tacks or seams are visible. As the head rests are about the only part of the seats to be seen, when a passenger looks down the car the seats finished in this manner present the appearance of being entirely new.

Improved Construction for Cores of Sweeper Brooms

A MACHINE for filling snow sweeper brooms as used in the Harvard shops of the Cleveland Railway was described in the ELECTRIC RAILWAY JOURNAL for July 10, 1920, page 87. Some additional details regarding the construction of the cores of the brooms which are filled with this machine are now available, and the accompanying line drawing illustrates the construction.

The shell in which the rattan is inserted is made of a single piece of sheet steel with cast ends. The sheet-steel core has four U-shaped recesses for receiving the rattan. The cast ends are riveted to the shell by four rivets which come in between the recesses. Maple bars fit into the recesses of the cores for holding the rattan in place. Brass hooks are fastened to the maple strips at intervals of 5⅛ in. These hooks are put in place by slipping them over the ends of the bars before the latter are inserted in the slots. Four of these hooks have projections at the bottom which extend through the shell and are held in place by cotter pins. A method of securing the maple strips is thus provided, so that they cannot separate or fly out centrifugally as the brush revolves.

The end castings have four pockets into which the maple cleats fit. A flange around the end casting prevents endwise and radial movement of cleats. An inner casting is also provided at the center, which is split and hinged at one side. The type of construction permits easy removal of the cleats for filling.



Improved Core Construction for Sweeper Brooms

Metering Car Energy Reduces Maintenance Cost

FOR several years the West Penn Railways has had the cars on its Allegheny Valley division equipped with Economy meters for measuring the car energy and checking the performance of the motormen. This has produced a substantial saving in energy consumption. According to Daniel Durie, superintendent, the principal advantage, however, has not been in this saving of energy, but in the reduced maintenance of equipment. The use of the meters makes the motormen careful in their handling of the equipment, and this in turn eliminates many of the causes of motor failure. The brake shoe

mileage, which was from 3,000 to 4,000 miles without the meters, has been increased to 8,000 miles by their use. This division is quite level, so that the wear on brake shoes should be a minimum.

Installing Additional Side Feeders

WHEN the overhead wires on a double-track line extend for a long distance without any taps connecting with a feeder cable, it is often desirable to connect the two trolley wires electrically at intervals between the feeder taps. Unless this is done one wire may carry a heavy load, while the other carries very little.

The intervals between side feed spans should be short in order to keep the two wires at nearly the same potential. This will also tend to prevent a wire becoming annealed, should it break and become grounded. In that case all of the current must pass through on wire from the nearest feeder tap to the point of grounding. After such an occurrence the wire is so soft as to be quite useless and has to be taken down and a new wire put up. The nearer the side feed spans are to each other the shorter will be the length of wire which is damaged in this way.

Occasionally section insulators may be so close together that there would normally be only one side feed span between them. In such cases it is better to put in at least one more connection between the feeder and the wire or between the two trolley wires, so that if the trolley ear at the side feed span becomes disconnected from the wire the trolley will not be dead.

New Equipment Available

Regulator for High Pressure Gases

A NEW regulator for controlling the delivery of acetylene, oxygen, hydrogen and other high-pressure gases is being marketed by the Alexander Milburn Company, Baltimore, Md. It is designed to maintain a constant, predetermined pressure regardless of fluctuations in the initial pressure line and variations in consumption.

The front cap contains an adjusting key, a top spring button and a tension spring. In front the body contains a flexible metal diaphragm. Soldered on and over this diaphragm is screwed a bronze diaphragm plate or spring button to hold the tension spring. Inside this body is a fixed nozzle containing a loose operating pin. Over the nozzle and loosely assembled is the valve sleeve, which has a roll of gas ports drilled through its circumference and carries the valve seat. The seat closes against the nozzle by initial gas pressure on the valve sleeve and pressure of a compensating spring resting in the recessed tank coupling. The loose operating pin inside the nozzle is actuated at one end by the deflection of the diaphragm and at the other by pressure of the valve sleeve.

The regulator closes with instead of against the gas pressure. This



New Gas Flow Regulator

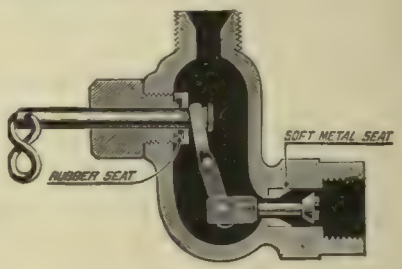
enables the sealing to be effected by pressure of several pounds instead of hundreds of pounds, as would be the case if the sleeve were yoked to the diaphragm. In this design the sleeve is entirely independent. An equilibrium is maintained in the regulator at all times, throttling the supply when the desired pressure is built up, and opening when the consumption lowers the pressure and an increased supply is needed.

The regulator is adapted for use with various gases by a change of the gages shown in the illustration. The rear connection is also changeable so that the regulator can be attached to various containers.

This regulator is the invention of A. F. Jenkins, who has long been associated with the acetylene industry.

Safeguard for Welding

A SAFETY valve for gas welding equipment has recently been placed on the market by the Mattingly Automatic Valve Company, St. Louis, Mo. This is designed to safeguard the welder and reduce fire hazards and losses of gas should the hose line become ruptured or



Safety Valve for Gas Welding

disconnected. In operation this valve is applied to oxyacetylene welding and cutting outfits between the hose and the gas tanks and does not interfere with the regular operation of the torch or regulator. An accompanying illustration shows a section of this valve. It consists of a right-angle body arranged for two connections. That at the right is connected to the regulator and the upper connection is for the hose. A valve with a soft metal seat operates between the connection to the regulator and the right-angle body. This valve is connected through a pivoted lever to a stem which extends to the left.

After the hose has been connected and all joints are tight, the stem connected to the valve is pulled to the left until pressure is built up in the hose line. With the normal pressure established any rupture or excessive leak will cause the pressure to drop suddenly in the right-angle body. The rush of gas from the tank will then automatically close the valve against the soft metal seat.

One of the most important advantages claimed for the valve is the feeling of security given the welder. The safety valve has no packing and the escape of gas around the stem used for holding the valve open is prevented by a soft rubber-seated valve which seats against a cone-shaped bushing through which the stem passes. This bushing can be unscrewed for any necessary attention.

Regular stock valves are carried for outfits using hose lines from 10

ft. to 60 ft. in length. Where other lengths are used, special valves are provided.

Brush-holder with Twenty-four Adjusting Points

THE new brush-holder for Westinghouse No. 508 railway motors shown in the accompanying illustration uses a "no-harness" type of spring mechanism fitted with cotter pin adjustment. Twenty-four adjusting steps are obtained by one revolution of the shaft. The inside end of the spring is anchored to the shaft, while the other end has a flat copper contact tip which bears on the top of the carbon brush.

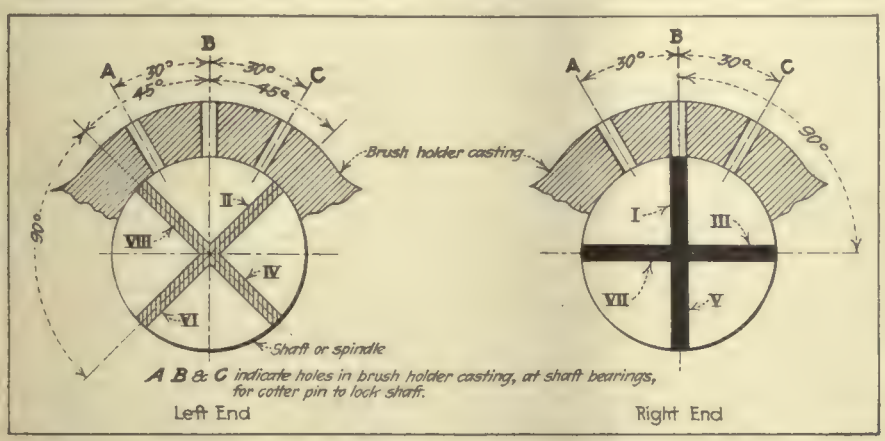
Two sets of three adjusting or locking holes, marked *A*, *B* and *C* on the accompanying diagrams, are drilled 30 deg. apart in the same plane in the brush-holder casting at the shaft bearings. Four adjusting holes, marked *I*, *III*, *V*, *VII*, are drilled 90 deg. apart in the same plane at the right end of the shaft, and four adjusting holes marked *II*, *IV*, *VI*, *VIII* are drilled 90 deg. apart in the same plane at the left end of the shaft.

These two sets of four holes are staggered with relation to each other.

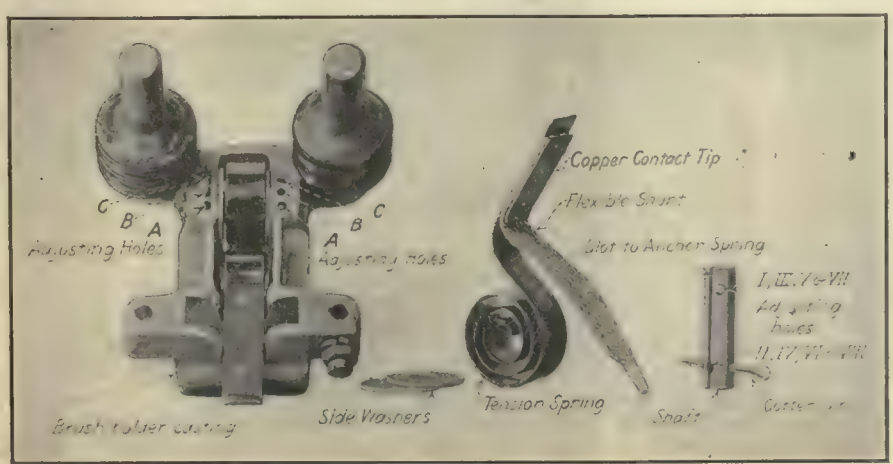
The use of the two sets of three holes in the brush-holder casting and the two sets of four holes in the shaft are necessary so as not to weaken the shaft construction.

To increase the tension on the top of the carbon brush it is necessary to wind up the pressure spring. This is accomplished by means of a screw-driver placed in the slot at the right end of the shaft. Starting with slot *I* at the right end of the shaft, which is in line with hole *B* in the brush-holder casting, and turning the shaft until slot *II* at the left end of the shaft lines up with hole *C* in the brush-holder casting, the shaft is advanced 15 deg. or one-twenty-fourth of a revolution.

It will be noted that with this arrangement on each consecutive adjusting step the cotter pin used to lock the shaft must be shifted from one end of the spindle to the other. Further, it must be placed in different locking holes *A*, *B*, and *C* in the brush-holder casting. Only one cotter pin is required to lock the spindle.



Sections of Shaft in Brush-Holder Casting



Brush-Holder Details

Compensating Fixture

A NEW lamp fixture for use in the series system of electric car lighting provides a means whereby the burning out of one or more lamps will not affect the remainder in the same circuit. This is being marketed by the Electric Service Supplies Company, Philadelphia, Pa. The accompanying illustration shows the "Type K" device in combination with a standard Safety Car Lighting Company's fixture and a reflector suitable for use in electric railway cars.

The control of the circuit is had by means of an enameled type resistor mounted in an ornamental fireproof canopy. Normally this resistor is out of the circuit; but the removal, breakage or burning out of a lamp automatically inserts the resistor in its stead.

In operation, if the circuit is opened, due either to removal of a lamp or breakage of a lamp filament, a small series solenoid is de-energized. The armature of the solenoid drops, establishing connections to substitute the resistor in place of the burned-out lamp. Placing a good lamp in the receptacle automatically energizes the solenoid and restores normal conditions.



This Fixture Has Device to Shunt a Burned-Out Lamp with Resistance

There is a growing tendency in car lighting to use high-powered incandescent lamps, with a corresponding reduction in their number and a simplification of the car wiring due to having fewer circuits. With such arrangements burning out one lamp would cause an entire circuit to be put out of service and would interfere seriously with the lighting. The use of this type of fixture is particularly suitable for such installations.

The News of the Industry

Operation to Cease on July 21

Commission Unable to Operate Spartanburg Property—Buses Will be Used—City Reticent

Another chapter in the railway affairs of the South Carolina Gas & Electric Company was concluded on June 22 when the Railroad Commission issued an order authorizing the discontinuance of operation within the city limits of Spartanburg on July 21. Service will be continued on the Clifton and Saxon lines and buses will be used inside the city limits to connect with the interurban cars which the company will continue to operate. It is expected that application will be made shortly to the city administration for permission to operate the new buses. The inability of the company to earn money is the reason given for the abandonment in the order of the commission. The company has been operating under the supervision of the commission since Jan. 13.

COMMISSION PRACTICED ECONOMIES

The railway problem in Spartanburg, referred to from time to time in the ELECTRIC RAILWAY JOURNAL, really came to a head on Dec. 31, 1922, when the operating company on the plea of heavy losses ceased to operate. On Jan. 13 after conferences with representatives of the company as well as a conference with the City Council of Spartanburg the commission took charge of the property, ordered service resumed, fixed schedules, rates, etc. At the very start the commission practiced the strictest economies so as to reduce operating expenses, but it was brought out at later conferences at which the public were heard that the service was not frequent enough. The commission went a step further and reduced rates from 10 cents to 5 cents in the desperate effort to furnish service to the residents of Spartanburg and environs at a rate which it thought would stimulate riding.

However, it was proved more and more conclusively that operation of this railway was a losing proposition and that something would have to be done in the near future. After operation by the commission for some sixty days the company petitioned the commission to arrive at a definite conclusion and take action. The commission went to Spartanburg for a public hearing in conjunction with the Chamber of Commerce. Nothing resulted from the meeting until the recent order of the commission.

The substitution of buses in Spartanburg was first advanced by the railway in the summer of 1922 after the foreclosure and reorganization of the property. The city, however, never acted on the proposition. It was the failure of the company and the city to reach an agreement over bus operation which led the company to place its cars in the carhouse in East Spartanburg on Dec. 31 last and leave them there until the commission took over the operation of the line.

The order which was issued by the commission in connection with the matter is in part as follows:

> Even in the face of the losses, the commission has kept the service moving since Jan. 13, 1923, until the present time, with practically the same result as shortly after the line was put into operation.
>
> The commission is fully cognizent of the decisions of the courts in many cases that while it has the authority to supervise service, rates, etc., it does not own and cannot operate and control these properties, and only in its earnest desire to furnish service to the people of Spartanburg has the commission gone as far with this matter as it has.
>
> Every effort and every method for improving the amount of traffic that is known to this commission has been tried, but all efforts have failed to develop sufficient traffic to warrant a continuance of the service. This could not be regretted more by anyone than by the Railroad Commission itself.
>
> The commission has realized from the beginning that anything it might promulgate and put into effect was only as a try-out and would furnish the commission with an actual basis for action one way or the other, and this matter has been publicly stressed through the press, by representatives of the commission, and by every means known to the commission, so that the commission could not be misunderstood in connection with the requirements of the law and its duty in matters of this kind. The results obtained have not been from hearsay evidence but are actual results from the rendering of service itself.
>
> The commission finds itself faced with the law requiring such rates as will yield reasonable return on the investment. In this case the commission has never been able to pull the revenue up as a result of the service to such point where a return of the investment could be figured at all, having been unable to even meet operating expenses. Therefore, to continue this service further would mean a violation of the provisions of all laws, as well as provisions of the constitution of our own state, and would without question result in the confiscation of this property. The commission's records will show many other things that could be put in evidence which would warrant the commission in issuing such order as it finds itself compelled to issue. It is not a pleasure or the desire of any member of the commission, but an absolute necessity to perform this duty.

George B. Tripp, president of the South Carolina Gas & Electric Company, said that the company would, of course, comply with the order of the commission and would do everything possible to work out successfully the problem of operating the Glendale-Clifton line with bus connections to the city proper. It is expected that the city authorities will resort to the courts, but Mayor John F. Floyd announced that the commission's order would not be discussed by the City Council until City Attorney Daniel returned from New York City, where he had gone on business.

Strike Threatened in Des Moines

Employees of Des Moines City Railway Show Evidence of Rejecting the Recent Wage Award

Des Moines is again facing the threat of a tieup of its railway lines. The present emergency is based on a threat of the men to strike following their dissatisfaction at the wage award made by the arbitration committee in a report brought in during the week ended June 23.

The findings of the arbitration board, composed of Rev. Elmer Nelson Owen, rector of St. Paul's Episcopal Church; J. G. Gamble, representing the company, and J. Ben Wiley, representing the men, provided for a scale during the year March 1, 1923, to March 1, 1924, of from from 48 cents to a maximum of 54 cents an hour. This is an increase of approximately 2 cents an hour, whereas the men were seeking an increase of 18 cents. Rev. Owen said that the new scale compared favorably with rates elsewhere and that any wage increase must also be considered with the effect it would have in bringing about a decrease in fare as provided by the franchise, thus benefiting the entire riding public of Des Moines.

Mr. Wiley signed the agreement, but immediately came out with a charge that he had been forced into signing by the threat that unless the increase was accepted as satisfactory the Reverend Owen would take a stand for no increase at all. This claim is not taken seriously. It is pointed out that in the event of a development such as Mr. Wiley cites the position of the men would have been improved had he refused to sign and then thrown the case before the public.

The men have appealed to the company from the finding, but were met with a statement from F. C. Chambers, president of the railway, that he could see no use of further negotiations.

Mr. Wiley has stated in the newspapers that the men will make every effort to avoid a walkout, and as this story is written the men say they will ask that the question of whether or not the contract calls for an arbitration of an award be submitted to the five judges of the court in Polk County.

There is a general feeling that the matter of wage disputes as covered in the agreement provides for submitting the question to three arbiters and that the decision of the arbiters should stand. The public therefore sees no occasion for a strike, particularly when the wage granted is comparable with that paid trainmen elsewhere.

Eight Killed in Brooklyn Elevated Accident

Cars Leave Structure and Fall Into Street at Busy Corner—Inquiries Under Way to Determine Responsibility—Cars Had Been Inspected Recently

EIGHT persons had died and thirty-seven were still in hospitals on June 29 as a result of an accident on the elevated railway in Brooklyn on June 25. Shortly after 2 o'clock on Monday afternoon both cars of a two-car train of the Brooklyn Manhattan Transit Company slid off the structure into the street, the rear truck of the rear car being the first to leave the track. The cars were of wood construction rebuilt in 1907 by the company. They were completely demolished in the fall. The accident occurred to a Bay Ridge two-car train westbound to New York as it was approaching the station in front of the Long Island Railroad terminal at the junction of Flatbush and Atlantic Avenues.

Inquiries into the cause of the disaster are under way by the public authorities, including the Transit Commission, and the company itself under the direction of President Menden. A statement issued by W. S. Menden, president of the railway, shortly after the accident was as follows:

The investigation of the cause of the accident this afternoon, while not complete, indicates that the rear truck on the rear car of the two-car train was derailed, for some cause not yet ascertained, at the frog of the switch just east of the Atlantic Avenue Station, causing the rear car to be precipitated into the street, dragging the forward truck of the rear car and the entire forward car, with its trucks, into the street, leaving the truck which was first derailed on the structure, practically at right angles to the running rails.

The track and switches at the location in question had been inspected in the morning, and found in good condition. Both cars of the train had been inspected on June 15, 1923, in accordance with the established practice, and found O. K. The two cars in the train had been operated on the same line over the same switch and frog for nine trips on the same day without any difficulty of any kind. The train was in charge of an experienced motorman with a good record.

The investigation is being continued in co-operation with public authorities to ascertain more definitely the cause of the derailment.

Investigations made by engineers of the railway, the New York Transit Commission and the city indicate that the rear truck of the rear car was the first to leave the track. The derailing occurred at a frog preceding a trailing switch, through which the train was operating. The switch controls movement through a cross-over which is used only for turning back trains at that point and forms a trailing connection between the two tracks of the elevated structure. The derailing occurred on a tangent level track, and the train had operated a distance of approximately 300 ft. on tangent track after it had passed around a curve from Fifth Avenue into Flatbush Avenue.

Information tending to show where the derailment occurred is furnished by the condition of the frog and ties immediately following it. The heel of the frog showed slight abrasions, and the first indications of cutting by the wheel flange on the ties was immediately following the frog. This cutting of the ties continued up and across them for a distance of approximately 10 ft. beyond the point of the switch, where the rear truck apparently was wrenched loose from the car body. This rear truck, according to a statement issued by Mr. Menden, remained on the elevated structure, all others being carried to the street below with the car bodies.

The real reason for the derailing at the frog has not been ascertained. Various conjectures as to what might have happened have been given out but definite information is lacking which would tend to give a solution.

The cars in the accident were numbers 913 and 919. They were originally purchased from the Wason Manufacturing Company in 1898. The motor trucks were Baldwin and the trailer trucks Wason.

One of the first among those to arrive on the scene was Mayor Hylan. He climbed the structure, looked over the scene and then submitted to being photographed as he examined a piece of the shattered guard rail. He rushed into print with a statement that somebody should and would be indicted; that he believed the accident was the result of using wooden cars; that he thought the switch had been tampered with after the accident occurred; that the truck probably was defective; that the Transit Commission was responsible through its inaction; that he would ask the Governor to call a special session of the legislature, and that the guard rails along the structure were unsafe.

These inept remarks merely brought down upon him fiery editorial protests from the *Eagle*, *Sun*, *Herald*, *World* and *Tribune* for seeking to make political capital out of a catastrophe to the community.

The protest thus made in the name of humanity was reiterated by Mr. Harkness of the Transit Commission, who spoke for that body in the absence of Chairman McAneny. Mr. Harkness said:

It seems to me that the accident is sad and deplorable enough without anyone try-



P. & A. Photo

View Taken Shortly After Brooklyn Accident, Showing Officials Examining Elevated Structure Near Switch

ing politically to capitalize it. I will not jump to any conclusions about it. We promptly sent engineers to the scene of the wreck and they in due time will turn in a report. A curbstone judgment on the cause of the accident is out of place.

Upon his return to the city Mr. McAneny reiterated the views expressed by his colleague on the commission. He accused the Mayor of playing politics with a heart-rending situation. In a later statement he said:

There may continue to be considerable difficulty in determining what actually did occur, but beyond the theory advanced by the commission's engineers that a bolt dropped from the mechanism of one of the trucks and caused the derailment, there is nothing as yet that offers a definite solution.

On Tuesday District Attorney Dodd announced that in order to assist him in his inquiry into the cause of the accident and to help fix responsibility for it, he had retained J. C. Brackenridge, now an independent consulting engineer but some years ago an officer of the Brooklyn Rapid Transit. He quoted Mr. Brackenridge as stating that the guard rails were intended to prevent such an occurrence as the accident, and that "if the timbers had been in good condition they doubtless would have done that."

To this statement Mr. Menden replied:

No guard rails could keep derailed cars from going over the side unless they were as high as the cars themselves. The beams are there to keep the trucks on the structure, and under ordinary circumstances the car bodies remain with the trucks. That the beams served their purpose in this instance is shown by the fact that the rear truck on the second car—the first one derailed—remained on the structure.

According to a report issued by the Transit Commission an inspection of the stretch of guard beams between Atlantic and St. Marks Avenues, a distance of 6,666 lineal feet, was made last December and revealed 36 ft. of damaged guard rail in three sections. These sections were reported on Jan. 9 as being "rotten and split from end to end." W. S. Menden acknowledged receipt of the report on Jan. 24.

Mr. Menden gave out a statement June 28 explaining that the commission's report covered a number of items and that he had given preferential consideration to more important ones. An inspection by B. R. T. engineers satisfied him that the beams complained of did not require immediate replacement. He said:

The designation "rotten and split from end to end," is a designation which has regularly been used by the commission's inspectors, and our check of these reports has shown that this heading did not properly describe the condition found either by the commission inspectors or by ours, and was not intended to indicate that the timbers were in such condition as to require immediate repairs.

Upon receipt of this report we had an inspection made of this line, and arrangements were made to give the matter all necessary attention, giving the more important items preferred attention, as indicated in letter to the executive officer of the commission dated Jan. 24.

Our inspection as well as that made by the commission's engineers indicated that the section between Thirty-sixth Street and Sixty-fifth Street required earlier attention. Our inspection did not indicate that immediate repairs were necessary to any part of the timber construction of the track between Fifth Avenue and Atlantic Avenue, all of which had been rebuilt new in 1913.

Reports of these physical surveys as made by the inspectors of the Transit Commission are sent to us from time to time as part of the routine inspection system in effect by the commission. These reports usually reach us about thirty days after the inspection has been made and are sent us for our information and attention.

We have always thoroughly inspected our property ourselves and have relied on our own inspection. We have never taken the position that we should await reports from the Transit Commission or any one else. Our own inspection has been thorough and reliable, but following any report from the Transit Commission we have immediately checked the results of that report, and this we did on the receipt of the report mentioned above.

CHAIRMAN DAHL DEFENDS EMPLOYEES

Gerhard M. Dahl, chairman of the executive committee of the B. M. T., in an announcement on June 28 regarding the switch at the scene of the wreck, which officials said was tampered with after the accident, stated that the investigation proved that the derailed truck might have thrown the switch and reversed the signal, so that it showed red. He also stated that if any individual threw the switch after the accident to mislead the authorities, he is a criminal and a fool. The statement by Mr. Dahl read in part as follows:

The motorman says the switch was in proper position, as he approached it. The signals showed green, meaning safety. The motorman is an old, trusted and experienced employee and we accept his statement as the fact.

It is undisputed that immediately after the accident the switch was in the reverse position, with the red or danger signal showing. It is also accepted that the switch was locked. The theory has been advanced that immediately after the accident, some one—presumably an employee with a key to the lock on the switch—unlocked the switch, reversed its position and changed the signals from green of safety to the red of danger.

We have no quarrel with either the honesty of purpose, sincerity, or good faith of those who advance this theory. But we do not agree with it, and in justice to our many employees, some of whom might rest under the cloud of suspicion, we believe it our duty to them and to the public to state our reasons.

The motorman of the train escaped with only minor injuries.

On Tuesday the Mayor announced that he would leave the matter in the hands of Mr. Dodd, and the inquiries into the causes of the wreck were in a measure merged. The Transit Commission, however, announced that it reserved to itself the right to conduct its own public hearings after the District Attorney had concluded.

Three engineers have been appointed by the B. M. T. to make an inspection of the structure where the accident occurred in an effort to determine the cause of the wreck. They are Dwight P. Robinson, J. H. Davies and George Pegram, chief engineer of the Interborough.

B. M. T. HAS MORE TROUBLE

One woman was killed and a woman and a man severely injured when an auto in which they were sitting was crushed beneath a shower of bricks after wind had hurled the 30 ft. wall at the rear of the carhouse of the Brooklyn Company backing on Bushwick Avenue into the street.

Accepts Beeler Report

The Commission Council of New Orleans passed a resolution on June 26 accepting the report on the local railway system by John A. Beeler, consulting engineer, New York, as a guide for all future action with respect to railway matters. At the same meeting the Council ordered all the standard gage track changed to wide gage to conform with the remainder of the system. This embodies about 34 miles of track, and it means that the standard gage cars will also have to be changed for wide gage operation. Provision was originally made in the trucks of these cars so that this change in structure can be readily made.

The Council also ordered the railway to build the Broadway extension, the St. Claude-Rampart cutoff, the Paris-St. Bernard extension and rerouting, to make the rerouting of the South Claiborne and Freret lines and to build the Elysian Field track and the Gentilly extension and make the new routings. These are all in conformity with the Beeler report and involve the construction of 10 to 12 miles of track by the company.

Publicity vs. Propaganda

"How do you distinguish between legitimate publicity and propaganda?" That was one of two questions addressed recently by Paul L. Harrison of the department of journalism, University of Kansas, to William Randolph Hearst, the publisher. The Hearst newspapers answered the question as follows:

"Legitimate publicity" is the spreading of truthful information, or facts, about any cause or condition which is of interest or importance to people generally, and not for the pecuniary or other advantage of the person spreading it.

Propaganda is the giving out (or hiring of) opinions, arguments or pleas to induce people generally to believe what some individual, group of individuals or organizations want them to believe, for the pecuniary or other advantage of the individual, group or organization giving out (or hiring) the propaganda.

Public opinion, meaning all the people, cannot acquire facts and information necessary to reach a correct conclusion on any question without full publicity.

Public opinion is often deliberately misled, deceived or seduced by propaganda or hired opinions.

To see no difference between "publicity" and "propaganda" is to see no difference between nutritious food and insidious poison.

Wages to Be Arbitrated.—The union of conductors and motormen in the employ of the Boston Elevated Railway, has made a demand on the company for an increase in wages to 91 cents an hour. Their present schedule is 61 cents. In negotiations between the union committee and the management of the company an offer of 65 cents an hour was made, but that offer was rejected by the union on June 22. The question of wages will now go to arbitration. The union has selected James H. Vahey as its arbitrator. A second arbitrator will be selected by the company, and these two men will select the third member, who will be chairman of the board. The present agreement expires on July 1.

University of Iowa Holds Conference on Public Utility Regulation

Iowa Mayors, city attorneys and public utility men were invited by the college of law of the University of Iowa to attend a conference on public utility, regulation and rate making in June. Various subjects were discussed by authorities on public utility affairs in the state and several experts from the East spoke.

Methods of valuing and inventorying utility concerns for the purpose of taxation and rate making were discussed by Dean William G. Raymond of the college of applied science, University of Iowa. Many important rate cases have been decided by Dean Raymond, as the referee.

The work of the State Railway Commission was reviewed by Dwight N. Lewis of Des Moines, a member of the commission, and Mayor Alfred C. Mueller of Davenport and O. N. Elliott, city attorney of Cedar Rapids, discussed rate-making practices of Iowa municipalities.

Connecticut Company and Men Agree on Five-Cent Advance

Following a referendum held on June 15, which resulted in a four to one vote by the men that they accept an increase of 5 cents an hour in their pay, the Connecticut Company announced that it would grant the increase to its motormen and conductors. About 2,600 men are affected by the agreement. This ends the negotiations concerning the annual contract which have been going on for the past few weeks. The new agreement is retroactive to June 1.

By accepting the 5 cents an hour increase, the Connecticut Company raised its original offer 1 cent. The company had offered the employees 4 cents an hour increase, but this had been refused in an earlier referendum. The men then voted to bring the matter to arbitration, but the sentiment was very strong against arbitrating the wage question.

Under the old scale two-men car operators, started at 47 cents an hour. At the end of three months the pay was 49 cents and at the end of six months, 52 cents. With one-man car operators the scale was 54, 56 and 59 cents. The men originally requested a scale of 60, 62 and 65 with a 75, 77 and 80 cents scale for one-man car operators. In their second referendum vote, however, the men were willing to accept the scale of 52, 54 and 57, with 59, 61 and 64 cents an hour for one-man car operators. This was the scale accepted in the referendum vote of June 15, rather than let the matter go to arbitration.

J. K. Punderford, vice-president and general manager of the company, stated that for a number of years the company had always made its final proposition in the original offer, but as the committee now had power to sign an agreement and to close the matter without further discussion, hoping that the company's action in granting the additional cent would be appreciated and encourage the men to better efforts on behalf of the public, it was willing to grant the increase requested.

Chicago Arbitration to Start July 9

Arbitration of Chicago's street car and elevated railroad wage dispute scheduled to begin on June 25 was postponed until July 9, after a brief session held in the office of Mayor Dever. The hearings will be held in the City Council chambers. The postponement was decided upon in order to permit the City Council to adjourn for the summer vacation. The boards of arbitration plan to hold daily sessions. The proceedings will be open to the public.

Couzens Claims Detroit Railway Operates at Lower Cost

Senator James Couzens, former Mayor of Detroit, has written a letter to the New York *Tribune* criticising some statements made in an article in that paper on the Detroit Municipal Railway. The article, which is one of several on this subject, challenged the statement that the lines had made $1,000,000 profit. Instead, it claimed there was a deficit, if all costs properly chargeable to operation had been included.

In his letter, which is in the issue of June 29, Mr. Couzens said that the test of efficiency of the operation of the lines is best based on a comparison between the Detroit lines and street railways in other cities. He compares the operating statistics for April, 1923, with March, 1923, and says that the results are that in every division of operating activity the Detroit Municipal System showed a lower cost than railways in other cities. On the subject of track paving the letter says that it is admitted that the car tracks and paving are not in good condition but "it is proved that they are in better condition than when owned and operated by the Detroit United Railway a little more than a year ago."

Mr. Couzens in his letter did not claim anything miraculous in railway operation but he did make the claim that the Detroit Municipal Railway operated at a lower cost than private companies do. In an editorial under date of June 29 the *Tribune* states that it was not trying to demonstrate that the Detroit Street Railways were better or worse run than other street railways. It merely undertook to investigate the claim of a $1,000,000 profit in Detroit in 1922-1923.

Brooklyn Wages Increased

A general wage advance for the employees of the Brooklyn City Railroad was recently announced by Clinton E. Morgan, vice-president and general manager. The increase, effective on Aug. 3, averages from 4 to 5 per cent, and affects about 2,500 motormen and conductors. Corresponding increases apply to the supervisory force, including inspectors, starters, and workers similarly employed.

Under the new schedule, Mr. Morgan explained, Brooklyn City employees, during the first year of their service, will receive 50 cents an hour, with gradual increases during the initial five-year period of employment as follows: Second year, 52 cents an hour; third year, 54 cents; fourth year, 57 cents; fifth year 62 cents.

The hourly wage under the existing arrangement is 45 cents for the first six months, 48 cents for the second six months, 50 cents for the second year, 52 cents for the third year, 55 cents for the fourth, and 60 cents for the fifth. All increases will take effect on the same date. A similar increase for employees of the Brooklyn-Manhattan Transit Corporation was announced on June 25.

Wages Increased. — Railway employees of the Dubuque Electric Company have been granted an increased wage scale. The new scale is arranged in three steps. First-year men are to receive 40 cents an hour, second-year men 44 cents an hour and men over two years in the employ of the company 49 cents. An additional 5 cents an hour will be paid men operating one-man safety cars. The old wage scale ranged from 35 cents to 45 cents and was divided into four steps. The scale proposed by the union provided for a maximum of 60 cents, or approximately an increase of 33⅓ per cent.

Third Arbiter Named.—A new wage agreement is being prepared for the Eastern Massachusetts Street Railway, Boston, Mass. The men and the company have agreed upon working conditions, to be embodied in the new schedule, but they could reach no understanding on wages, and decided to submit that question to arbitration. The union has selected James H. Vahey as its representative on the special board of arbitration, and the company will be represented by Fred A. Cummings, assistant to the chairman of the board of public trustees. The third member, who will be chairman, is Henry C. Attwill, chairman of the Massachusetts Department of Public Utilities.

Wages and Fares Increased.—A wage and fare increase, affecting the employees and patrons, of the Homestead & Mifflin Street Railway, Homestead, Pa., was recently announced by officials of the company. The wage advance, effective June 1, will bring the schedule up to 70 cents and hour. The men were receiving 60 cents. The increase in rates of fare, effective June 15, will mean a cash fare of 10 cents, instead of 8 cents as formerly charged. Tickets will be sold at the rate of fifteen for $1, instead of eighteen for $1. Officials of the company stated that the increase in the rates of fare was due to the result of an increase in wages and the cost of power and material.

Financial and Corporate

Montreal Tramways & Power Company Reports

A report of the Montreal Tramways & Power Company, Ltd., a holding company for Montreal Tramways, Canadian Light & Power and several other companies, covering the fiscal year ended Nov. 30, last, has been issued, the first of its kind made public.

Total assets are $28,799,071, representing various securities of subsidiary companies which also include a profit and loss balance of $1,774,071. The liabilities include issued capital stock of $17,578,330, and five-year 6½ per cent notes of $7,300,000. In addition there is a Montreal Public Service loan account of $2,592,500, accounts payable $1,276,199, and accrued interest $52,041.

The profit and loss account for the year shows that the income from securities owned was $672,514. Of that amount $526,529 was disbursed in interest and after a few smaller disbursements there was a credit balance of $98,274.

Sale of Oakland Properties Ordered

Judgment of foreclosure and decree of sale of the San Francisco-Oakland Terminal Railway and subsidiaries were signed on June 18 by Superior Judge James G. Quinn in Oakland. Commissioner of Sale J. B. Lanktree is directed to conduct a public sale of the properties not earlier than twenty days. Judgment given by the court amounts to $24,000,000. Mr. Lanktree has suggested July 17 as a tentative date for the sale.

Operative property of the company was valued at $19,000,000 by the Railroad Commission on Aug. 11, 1919, and the non-operative properties were valued at $6,327,680 in 1915 by the same commission.

Judge Quinn decreed that no bid less than $10,000,000 can be accepted.

Sale of the property to satisfy the bondholders was ordered by Judge Quinn after a hearing of the suit brought by the Mercantile and the Union Trust Companies, trustees.

New articles of incorporation recently filed by officials of the company provide for three companies, the Key System Transit Company with a capitalization of $17,500,000; East Oakland Railway, capital stock $250,000, and the Oakland & Hayward Railroad, capital stock $250,000.

The reorganized company will have a total capitalization outstanding in the hands of the public of $28,239,785, of which $2,500,000 will take the form of 6 per cent notes, $11,861,385 bonds and the balance common, preferred and prior preferred stocks. Previous capitalization of the entire system was $48,332,000, of which $20,157,000 is represented in bonds and notes.

Prices of Traction Bonds Carried to Low Level in Recent Liquidation

Traction bonds are on the bargain counter, says the *Wall Street Journal.* It ascribes this to the recent wave of liquidation, following failures of several brokers, which carried prices of many traction bonds down to low level of the year, and in some instances to record low prices. This weakness was due solely to market conditions, and not to any development in traction companies or their individual securities. The *Wall Street Journal* recognizes that the traction industry has shown marked improvement throughout the United States, and particularly in New York City, during the past year. It says that the financial structures of the companies as a whole, as well as earning power, are in better condition than any time since the war.

A compilation of traction bonds, listed on the New York Stock Exchange follows, showing high prices reached in 1917, high and low levels in 1922, and closing or last prices on June 20, 1923, with income return:

Interest on Hudson & Manhattan adjustment income 5 per cent bonds is payable if earned, and is cumulative. Interest is being paid regularly, and all accumulated interest has been paid. Interest on Third Avenue Railway adjustment income 5s, 1960, is payable if earned, and is cumulative. Payments are being made regularly, and in past year 1¾ per cent was paid on accumulated interest now totaling 20 per cent.

Doherty Interests Buy Toledo-Western Line at Foreclosure

The Toledo & Western Railroad property was sold on June 19 by special masters at Sylvania, Ohio, to Frank R. Coates, representing Henry L. Doherty & Company. The purchase price was $600,000. The sale is subject to confirmation by the Federal court at Toledo, and was made in satisfaction of a decree in foreclosure brought by holders of the first mortgage bonds.

The line extends from Toledo to Pioneer, Ohio, with a branch to Adrian, Mich. It has been in the hands of receivers nearly three years. The company does a large freight business in that territory and some passenger business, with only a beginning made in the business of distributing power along the line.

Attorney Morton Seeley, Toledo, counsel for Mr. Coates, made the successful bid in opposition to Marion M. Miller, president of the Home Savings Bank and chairman of the bondholders' protective committee.

The sale gives the property to the Doherty interests at about $8,000 a mile, clear of all encumbrances, except some car trust obligations and customers' deposits. There were two underlying mortgages—one of $1,250,000 on the Toledo & Western and one of $250,000 on the Toledo, Fayette & Western, which, together with matured coupons unpaid, amounted to $1,773,096 at the time that the decree of sale was issued.

There was also a second mortgage amounting to $500,000 held by the Doherty interests.

The reorganization of the company will enable it to finance itself and provide new capital for improvements and betterments.

Issue:	1917 High	1922 High	1922 Low	1923 June 21	Per Cent Yield
B'way and 7th Ave 5s, '43	100	78	50	62	9.19
Brooklyn City con 5s, '41	101½	91	75	84¼	6.44
Brooklyn Union El 5s, '50	101½	90½	75	80½	6.57
Chicago Rwy 1st 5s, '27	97¾	85	67	79¾	11.59
Conn Ry & Lt 4½s, '51	101¾	82¾	75	84	5.65
Detroit United 4½s, '32	86½	86½	63½	84	6.92
Ft. Smith Lt & Pr 5s, '36	84			70½	8.91
Hudson & Man ref 5s, '57	69½	88½	75	80½	6.44
adj income 5s, '57*	25½	67¾	47½	55½	9.01
Interborough R T 5s, '66	73½	78½	54	63	8.06
10-year 6s, '32	..	83¼	72¾	61	13.40
convertible 7s, '32	..	98¾	93½	88	8.99
Kings Co. Elev 4s, '49	86¾	81	64	70	6.39
Manhattan Rwy 4s, '90	94	72½	57½	59	6.86
second 4s, 2013	60	63½	48¾	55¾	7.02
Manila Electric 7s, '42	..	..	..	97½	7.25
Manila El Ry & L 5s, '53	85	84	64½	82½	6.30
Market Street Ry 5s, '24	81½	92½	81	92¾	13.00
5-year notes 6s, '24	..	97	90¾	97	9.21
Milwaukee E R & L 5s, '26	103½	97	91¾	98	5.73
ref & ext 4½s, '31	93	90	79½	89½	6.19
general A 5s, '51	91½	..	..	91¾	5.62

* Direct return.

Issue:	1917 High	1922 High	1922 Low	1923 June 21	Per Cent Yield
Milwaukee E R & L 1st B 5s, '61	..	..	..	84¾	6.00
Montreal Tramway 5s, '41	97½	92¾	83	88¾	6.03
Nassau Electric 4s, '51	74½	65	27	59½	7.45
N. Y. & N. Jersey 5s, '32	100¼	97½	92	96¾	5.45
N. Y. State Ry 4½s, '62	87½	73	61½	62¾	7.42
1st cons 6½s, '62	..	..	..	94¼	6.91
Northern Ohio T & L 6s, '47	..	97½	92	92¹	6.61
Portland Rwy ref 5s, '30	88½	91½	81	86¾	7.50
Portland Ry Lt & P 5s, '42	78½	90	78½	82¼	6.63
refunding B 6s, '47	..	..	..	94½	6 46
refunding 7½s, '46	..	108½	102	105	7.06
Rapid Transit Sec 6s, '68	..	..	..	70½	8.62
Public Service of N. J 5s, '59	..	90½	73	83½	6.15
St. Paul cable 5s, '37	102½	..	..	92	5.84
Third Avenue ref 4s, '60	80¾	69¾	56¼	54½	7.83
adj income 5s, '60*	73½	68¾	44½	49½	10.10
Third Avenue Ry 5s, '37	108	98½	88	92	5.84
Toledo Tr L & P 6s, '25	..	100	98¼	98¾	6.75
Union Elevated 5s, '45	84	..	..	70	7.90
United Rwy Invest 5s, '26	70	91	75	92	8.05
United Rys St. L 4s, '34	61½	69½	51½	62	9.69
Virginia R & P ref 5s, '34	93½	88½	72	84	7.12

More than $200,000,000 Valuation

Present Seven-Cent Rate in Philadelphia with Four Tickets for a Quarter Declared Neither Unreasonable Nor Preferential by Pennsylvania Commission in Rate Case Dating Back to 1920

THE Public Service Commission of Pennsylvania has sustained the right of the Philadelphia Rapid Transit Company to the present rates of fare charged. The decision of the commission was rendered late on June 21. It means that the company will continue to charge a 7-cent cash fare and to sell four tickets for 25 cents. On the question of value the commission has ruled that the holdings of the company are in excess of $200,000,000. The contention of the company on that matter was for an allowance originally of $290,729,742 and of $316,423,557 as of May 1, 1923, while the city held out for a value for rate-making purposes of $189,265,781.

After discussing the details of the case the commission reached the following conclusion:

1. We do not find it necessary in this proceeding to arrive at a final determination of the present fair value of the property of the company. However, our consideration of the items of evidence before us, including the questions of depreciation and going concern value and of matters in dispute between the company and the city, leads us to the conclusion that under established legal principles the present fair value of the company's property is substantially upward of $200,000,000.

2. With regard to operating expenses, we are not disposed to interfere with the budget submitted by the company as long as the company continues its present policy of improved service and a high standard of maintenance.

3. In this connection we are of opinion that the company has established its rights to share in additional profits resulting from approved economies and efficiencies in its operation.

4. Looking to the future, we feel the present fares and the revenues and credit which they produce should make possible further and continued improvement and expansion of transportation service and facilities in Philadelphia to meet the growing needs of the city.

5. An assumed rate base as low as $200,000,000, with 7 per cent as the fair rate of return, results in the amount of $14,000,000 available as the fair return. This, plus the allowed operating expenses, as appears in respondent's budget of $30,868,000 and taxes of $2,818,000, gives an allowable annual gross revenue requirement of $47,686,000. The operating revenue for the year 1922 being in actuality $42,530,000, and the unimpeached estimate of operating revenue for the year 1923 being but $44,736,000.

The respondent's rates of fare as contained in its Tariff No. 81, now in effect and originally established under order of Oct. 18, 1920, are neither unjust nor unreasonable nor under the evidence are they unduly discriminatory or unjustly preferential.

The right of the company to continue to collect the fares thus established and in effect is confirmed and the complaint dismissed.

The commission says in effect that it would in any event allow a 7 per cent return as a minimum on the present fair value of the property and that were a definite valuation found necessary the fact that a 7 per cent return would produce a surplus after providing for a liberal operating budget is the best proof not only of the revenue-producing effect of the economies and efficiencies introduced by the company but also of the fact that the company is securing its fair share of these. In other words, as the commission sees it, the company is entitled to share in the results of the economies and efficiencies which it has brought about.

The proceeding had its inception on June 1, 1920, when the company filed a tariff which would effect an increase in gross revenues by the abolition of the free transfers and of certain exchange tickets then in use. The city protested and asked for a valuation of the property in connection with the determination of the general question.

This tariff was subsequently withdrawn. On Oct. 4, 1920, a petition was filed for a new tariff, but this the commission refused. In this proceeding the commission found that the proposed rates would be unreasonable and unjustly discriminatory, but as it appeared the company needed a greater revenue, the commission by an order entered Oct. 18, 1920, directed the company to file a tariff providing for a 7-cent cash fare, with four tickets for 25 cents, the transfer and exchange privileges to remain as theretofore. Throughout these various steps dealing with the rates of fare the commission reserved the matter of determining the value of the company's property and the order last referred to was an interim order pending such valuation and in terms effective for six months from Nov. 1 of that year. As the valuation had not been concluded at the expiration of the interim period, the company then filed a tariff continuing the rates originally prescribed by the commission and those rates are the ones now in effect.

VOLUMINOUS RECORD MADE

The record in the case comprised more than 6,000 pages of testimony and more than 2,100 pages of exhibits. It also contained detailed studies directed to the question of the reasonableness of the rates, based on comparisons, with charges for like service in similar cities and with the decreased purchasing power of the dollar.

The commission in its decision pointed out that respondent at the argument raised for the first time the point that there had been no complaint filed against the present tariff, and that, therefore, technically, the burden of proof rested upon the complainant city in the proceedings. It was the view of the commission, in the light of all the testimony presented, that this question was largely academic. The commission said that a full and comprehensive investigation has been made, and evidence presented on the part of the complainant and respondent, with a view of determining what are the just and reasonable rates which the company may charge and the allowable gross revenue which the company may receive. So full and complete was the testimony presented that the commission expressed the opinion that the case ought not turn on any narrow construction with respect to technical rules where there has been a full disclosure of all relevent facts necessary to reach a conclusion on the merits.

As noted in the ELECTRIC RAILWAY JOURNAL for May 19, page 863, arguments in the case were concluded on May 15. Early in the present month both sides presented briefs. In this controversial matter neither side was very sparing of the other in attempting to drive home its arguments, but all this is largely a matter of history now. In short, in its brief the company renewed its claim for a valuation of $316,423,557 on the price trended to May 1, 1923, and asked the commission carefully to consider the evidence in the case, "which tends strongly to show that a return of 7 per cent is within the realm of confiscation and that at least 8 per cent is necessary to achieve the protection the company requires."

The brief of the city pointed out that there necessarily were many differences in judgment between the company's experts and its experts, but it asked that certain paragraphs of the company's brief, considered by it not to be in good taste among opposing counsel be suppressed. This document alone was one of sixty-nine printed pages. In it specific reference was made to the operating contract of 1907, between the city and the company. Counsel for the city said that this contract fixes the rate of fare at the then prevailing rate and stipulates that it shall continue unchanged without the city's consent during the life of the contract, which expires in 1957. It was not suggested by the city that the commission in ordinary cases is without power to alter rate provisions of contracts between utilities and their patrons, but the city did call the attention of the commission "special circumstances which take this contract beyond the power of the commission to alter the rate of fare provisions in it."

Mayor Moore was one of the members of the party on the Leviathan when the decision was announced, but immediately upon his return he stated that the city would appeal the decision. The idea that has been conveyed is that if the contract of 1907 is to be modified, it should not be done without the consent of the city.

$73,114 Profit for Detroit Lines in May

Ross Schram, assistant general manager of the Detroit Department of Street Railways, reports that the earnings of the department for May showed gross revenue from transportation of $1,762,166, a daily average of $377 above that received for April. Operating expenses were $1,352,337, with profit at $73,114.

Line Purchased.—The West Chester, Kennett & Wilmington Electric Railway, Kennett Square, Pa., was purchased by a committee of bondholders at the sale held on June 1 at the office of the trustee, the Integrity Trust Company, Fourth and Green Streets, Philadelphia.

City Wants $27,474,767 Cut from St. Louis Valuation

A complaint that the Missouri Public Service Commission valuation of $52,838,110 for the United Railways, St. Louis, is excessive, unlawful, unjust and unreasonable to the extent of at least $27,474,767 is made by the city of St. Louis in an application for a rehearing filed with the commission this week. The railway will ask for a rehearing on the ground that the sum set is too low.

The items attacked by the city and the reasons are as follows:

Construction Overhead Costs.—No deduction for depreciation of this item was made, and it hence is at least $2,179,585 too high. The item itself should be cut $5,252,013.

Depreciation of Physical Property.—The deduction for this item was at least $6,039,815 too low.

Pricing of Physical Inventory.—The commission made a grossly excessive allowance for increase of prices to reflect present value, and this item should be reduced $8,753,355.

Going Concern Value.—The commission allowed $2,500,000. The city asserts no allowance should have been made.

Promoting, Financing and Consolidation.—The entire allowance of $2,700,000 should be deducted.

Working Capital.—This item should be reduced $49,999.

The company's appeal probably will be filed soon. In the meantime reorganization plans are held up.

As to the 7-cent fare charged in St. Louis by the United Railways under the commission's order, the city's motion reads as follows:

The fares prescribed by the commission, by its supplemental order, made and entered in the above entitled proceedings on April 2, 1920, and thereafter from time to time extended as the maximum fares to be charged by the receiver for the United Railways in the city of St. Louis, to wit, 7 cents for adult passengers and 3 cents for half fare passengers, are excessive, unjust and unreasonable, yielding, as they do, an amount available for return on capital after paying thereout the operating expenses, including taxes and $1,500,000 per year, for depreciation, which is equal to a return of more than 13 per cent upon the true fair present value of said property, and the said order of the commission, made and entered in the above entitled proceedings, on June 4, 1923, is erroneous and the commission erred therein in its finding and conclusion that no reduction of said fares will be justified until operating conditions shall have been improved either from increased revenues or decreased operating expenses.

Said order is erroneous and the commission erred therein in its finding and conclusion that no reduction in the fares charged by the receiver for the United Railways in St. Louis will be justified until operating conditions shall have been improved by either increased revenues or decreased operating expenses; the said finding being based upon the erroneous valuation of the property of the said company aforesaid, and upon the erroneous assumption that the gross income of $3,425,155, being the amount available for return on capital after paying out of revenues the operating expenses, including taxes and $1,500,000 a year for depreciation is equivalent to a return of more than 13 per cent upon the true fair present value of said property, which return is excessive, unjust, unreasonable and unlawful.

Seattle Mayor Opposes Boston Negotiations

Immediate negotiations between the city of Seattle and the trustee for the holders of the Municipal Street Railway purchase bonds of $15,000,000 has thus far been blocked by Mayor E. J. Brown, who states that he is "unalterably opposed to any trips to Boston," where the trustee states the conference must be held between the bondholders and representatives of the city. The City Council announces that it will adopt an ordinance immediately which will instruct the Mayor, Corporation Counsel, president of the City Council and chairman of the finance committee to go to Boston to negotiate an extension of the street railway bonds, and the proposition will then be up to the Mayor.

The ordinance contains no thirty-day alternative clause so if the Mayor vetoes the ordinance, the proposal will be abandoned, and it will then be up to Mayor Brown to make a better proposal. The Council states that it has no intention of over-riding the Mayor; it merely believes the Boston trip would be the best plan, and is putting it up to the Mayor.

According to an opinion by Corporation Counsel T. J. L. Kennedy, extension of time on the remaining purchase bonds of the municipal railway, if agreed to by the city and the bondholders, would amount to a ratification of the purchase contract and would prevent the city from rescinding the contract by future litigation on the ground of fraud and deceit. Such an agreement might not prevent the city from bringing suit for damages, he said.

The present plan is to ask an extension that would permit the city to pay $250,000 on the principal every six months, or more if the money were on hand. The utilities committee has found that under the present conditions the street railway will be on a warrant basis until September, 1924, and the largest total of outstanding warrants will be $592,057 on July 25, when supplies, salaries and appropriation for principal and interest must be met.

London's Municipal Trams Report Surplus.—The London City Council reports for the year a surplus of £230,000 from the municipal tramways operations.

Auction Sales in New York.—At the public auction rooms in New York on June 27 there was offered $2,000 of the Cleveland, Elyria & Western Railroad extended 7 per cent bonds, due 1923, 60 per cent.

Will Not Oppose Track Abandonment.—The Twin State Gas & Electric Company, Brattleboro, Vt., now intends to abandon its tracks by Sept. 1. West Brattleboro residents, who obtained a stay of the proposal, are said to have decided to withdraw their opposition to the substitution of buses for the railway.

Net Income Increased.—For the eleven months period ending May 31, 1923, the Brooklyn City Railroad realized a passenger revenue of $10,702,607 against $10,406,126 for the similar period ending May 31, 1922. After considering income deductions the net corporate income for the period of this year was $2,011,550. This compares with $1,566,169 for the eleven months ending May 31, 1922.

First Run Over Section of Old Shore Line.—A trial run was made a few days ago over the revamped section of the old Shore Line Electric Railway from New Haven to Trap Rock, Conn. A. William Sperry, New Haven, who has undertaken to reclaim the road, was aboard the first car. Among others who witnessed the test were representatives of the bankers interested in financing the new company which will operate the line.

To Be Sold at Auction.—The Concord, Maynard & Hudson Street Railway, Maynard, Mass., was to be sold at public auction on June 29. Operation was suspended in March of this year when a bus service was organized to supplant the railway. The property went into the hands of a receiver in March, 1922, and operation was ordered discontinued by the court because it could not be made to pay. The discontinuance of this line has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Quarterly Dividend Reduced.—The directors of the United Electric Railways, Providence, R. I., have reduced the quarterly dividend from 1¾ per cent to 1 per cent, payable on July 2, to holders of record on June 20. Because of the unusually heavy operating expenses in the first quarter of the current year, and the inability of the company to start, as soon as was expected, many increases in operating efficiency which had been planned when the fares were reduced to 5 cents, the directors found it necessary to take this action.

Stabilizing Fund Reduced in Toledo.—The fare stabilizing fund of the Community Traction Company, Toledo, was reduced by $17,906 following May operations, which brought into effect the increase in wages for trainmen and shopmen and was followed by a slump in riding. It is expected the operations for the next few months will show deficits even though two months ago the peak was reached in surplus earnings. Bus feeder operations are more satisfactory with the Oak Street line earning 78.86 per cent of operating expenses. The Erie Street line, however, is only bringing in 20.98 per cent of the cost of rendering the service.

Gold Bonds Offered.—Bonbright & Company and W. C. Langley & Company are offering $2,500,000 of first and refunding mortgage gold bonds of the Carolina Power & Light Company, known as 6 per cent series of 1953. The bonds are dated June 1, 1923, and are due June 1, 1953. The bonds are offered at 97½ and accrued interest to yield more than 6.15 per cent. The proceeds from the sale of these bonds will be used to pay, in part, for the acquisition of a new power station which will have an initial installation of 15,000-kw. and for other corporate purposes. The Carolina Power & Light Company operates the entire electric power and light, street railway and gas service in Raleigh, the gas service in Durham, the electric power and light service in Goldsboro, Henderson, Oxford, Sanford, Dunn and Jonesboro, and supplies electric power to sixteen other communities in North Carolina.

Traffic and Transportation

Saginaw Approves a Fifteen-Year Car-Bus Franchise

After a suspension of street car service since Aug. 10, 1921, Saginaw is again to swing into line with other cities of the country having approved a fifteen-year street car-bus franchise at a special election held on June 25. The vote was 9,112 to 3,061, which is 1,808 more than the required 60 per cent for approval. The franchise provides for a 10-cent cash fare with four tickets for 25 cents.

More votes were cast than at any special election in the history of Saginaw and the franchise received a 60 per cent approval in twenty-five of the twenty-seven voting precincts and in the two it received a majority vote.

The franchise approved is a modification of two grants that were submitted on Nov. 7 and again on April 2, both of which lacked only a few votes of the required 60 per cent. With the new city administration taking office on April 9, steps were immediately taken to eliminate from the other contracts features that the present Council members believed were the cause of the failures of the franchises, and as soon as the finished document was approved by the bond owners' protective committee of the bankrupt Saginaw-Bay City Railway Company, the Council submitted the measure.

While there was some work done in behalf of the measure the election was exceedingly quiet. A few days before the election the Mayor and three of the four councilmen issued a public appeal to the electors to support the measure. One councilman asked that it be defeated.

Probably four to five months will be required before the system becomes operative. Motor buses must be purchased, the rolling stock renewed, painted, etc., tracks repaired, special crossings that were removed by steam railroad companies will have to be replaced and much new track laid. All told, at least $400,000 will be required to rehabilitate the property.

The company when organized will be operated independent of any other local utility and at least six of the nine members of board of directors must be citizens of Saginaw.

Token Fare Now 8½ Cents in Seattle

Increase in the fare on the Seattle Municipal Railway went into effect on June 16, without a hitch. Special messengers of the railway were stationed at all transfer and junction points, and several automobiles were pressed into service in an effort to keep conductors supplied with the new 8½-cent tokens. The fare is now 10 cents cash, or three tokens for 25 cents. The increase was made after an experiment with the 5-cent cash fare which lasted three and one-half months. New fares provide transfer privileges to all car and bus lines in the city, as well as the privately owned Seattle & Rainier Valley lines. An increase in revenues of $5,000 a day is expected under the new fare.

Advertising Value of the 5-Cent Fare Capitalized

The cars now being built for the San Francisco Municipal Railway have the words "Fare 5 Cents" neatly painted on the sides near the entrance at either end. The letters are gold leaf, 2 in. and 4 in. high, so the words can be easily read from the sidewalk. Being near the entrance they suggest to the passenger the idea of having the fare ready and to the visitor they advertise the low fare which the city's residents enjoy on the municipal railway.

Payment of Taxes Deferred to Prevent Fare Increase in Cincinnati

An ordinance to defer consideration of the franchise tax of the Cincinnati Traction Company until January, 1924, as a factor in fare rate making was passed by the City Council, by a vote of twenty-seven to three, two members being absent. Passage of the measure prevents an increase in fares.

When Councilman-at-Large W. E. Hess, a member of the street railway committee, protested that the ordinance had not been before that committee, Councilman Charles O. Rose insisted that the rule of reference be lived up to, whereupon Floor Leader C. E. Martin withdrew his motion for suspension and the ordinance took the regular course.

The ordinance, however, was not passed until Councilman Edwin E. Kellogg again had advanced arguments against the measure that he had made on former occasions when similar action was taken by the Council to prevent an increase in fares.

Councilman Martin in answering the argument of Councilman Kellogg said the tax could be paid only if "earned" and it could be earned only out of the car riders. He said if the ordinance was not passed fares would automatically advance one-half a cent. The ordinance must be accepted by the traction company before it is in effect. It is understood the fare will remain at the present rate.

Under the terms of the service-at-cost franchise the tax of $350,000 annually is not due until it is earned. The ordinance defers payment of the tax for another six months.

Authorizes Six-Cent Fare Continuation in Dallas

The 6-cent fare charged by the Dallas Railway was extended for eighteen months from June 27 on condition that the railway spend $705,915 in extensions, rebuilding and repairs and in the purchase of thirty additional cars during the eighteen months. The company is given ten days to signify its acceptance or rejection and the 6-cent fare is extended for ten days.

The program of improvements demanded by the city includes the extension of the Junius Heights line into Lakewood Heights, a distance of about 1 mile; extension of State Street line for ten or twelve blocks and local car service over the new Denton Interurban. In addition to these extensions the railway must take over the Trinity Heights line and establish the 6-cent fare some time during the eighteen months. The company, however, is left to work out the details of taking over this line, which is now operated by the Texas Electric Railway.

It was at first proposed by the city officials to demand improvements costing only $500,000 during the year in return for the fare extension, but Mayor Louis Blaylock said that a close examination of the earnings of the Dallas Railway showed that the company could well expend a larger sum and still show a fair return on its investment. The extensions and other improvements demanded are such that they increase the earnings of the traction company, Mayor Blaylock said.

John W. Everman, supervisor of public utilities, has made a close study of the traction company earnings, needs of traffic, etc., and the program of improvements demanded by the city is in line with his recommendations.

Formal application for extension of the 6-cent fare was made to the City Commission by Judge Holland, president of the Dallas Railway Company, but in this formal application the traction company did not suggest any extensions or improvements to be made in return for the fare extension, and this fact caused some surprise among members of the City Commission.

In his application for a continuation of the 6-cent fare Judge Holland said that the earnings from a lesser rate of fare would be wholly inadequate to enable it to provide the character of service required by the people of Dallas to make the remaining improvements designated in the Everman plan.

Court Decides Bus Competition Will Not Be Tolerated

The Supreme Court of Illinois on June 24 affirmed a judgment recently handed down by the Superior Court of Cook County wherein it reversed the order and decision of the Commerce Commission relative to the operation of a bus line in competition with an electric railway.

The opinion of the court was delivered by Chief Justice Farmer. It is regarded

as bringing to light phases of public utility operation and ownership relative to service and rates of fare which may serve as a precedent in future controversies of the kind.

The bus company had secured a certificate of necessity and convenience from the Illinois Commerce Commission, and after complying with the rules and regulations of the commission it started to operate buses along a route which in many places parallels the existing railway.

Notwithstanding the opposition of the railway when the bus line first sought an operating permit, the Illinois Commerce Commission decided to issue a certificate of necessity and convenience to the bus company, but this order was reversed by the Superior Court of Cook County. The bus company then appealed the decision to the Supreme Court of Illinois.

In a few words, the ruling of the high court of the state is interpreted to mean that a bus company will not be granted the right to operate through a territory served by an electric railway unless the public as a whole as distinguished from any number of individuals is convenienced by such an operation.

The bus company has petitioned the Supreme Court of Illinois for a rehearing. If this is not allowed it is expected the case will be carried to the Supreme Court of the United States on the ground of confiscation of property.

Louisville Railway Subsidiary Starts Bus Operation

The Kentucky Carriers, Inc., the $200,000 subsidiary of the Louisville Railway, started service on Third Avenue on June 24, using four buses, each seating twenty-six people, and being of the single-deck type. These four cars maintained a ten-minute schedule under a 10-cent fare, on a route from Main Street to the Confederate monument, a distance of twenty blocks.

The first installment of cars consists of six, with six more to arrive about July 1. They come from Cleveland and represent Bender bus bodies on White bus chassis, equipped with double pneumatic tires in back and single pneumatics in front.

A total of twelve double-deck buses will be placed in service in September or October, these also to be built on the White bus chassis, using bodies of the Yellow Coach Company, Chicago, and to seat sixty-eight persons.

One operator is employed on the single deckers and two will be employed on the double deckers. Drivers are being picked from the company's own organization, a call having been issued for men who have had experience in driving White or similar trucks.

The trucks are finished outside in royal blue and on the inside are upholstered in leather and finished in mahogany.

The plan of the company to use buses was reviewed in the ELECTRIC RAILWAY JOURNAL for June 2, page 944.

City Will Fight Houston Fare Rise

The city of Houston will fight to the last ditch the suit filed by the Houston Electric Company in the United States Court for the Southern District of Texas, seeking a higher fare for the company in Houston. The company in its petition for a bill in equity set forth that the present fare of 7 cents with four tokens for 25 cents is inadequate and amounts to a confiscation of its property, and in support of this allegation the company sets forth a long statement of its earnings and operating expenses. The figures given in this statement are the same as those filed with the City Council some weeks ago in its petition for an increased fare, which the city declined to grant, but in return agreed to cut the number of jitneys operating in Houston to 150.

Judge J. C. Hutcheson, before whom the petition was filed, has set the matter for hearing on July 5. The hearing will be upon the question of an injunction to restrain the city from prohibiting the company in its efforts to charge and collect a higher fare than that fixed by the city. It is regarded as probable that Judge Hutcheson will appoint a special master in chancery to hear evidence as to the valuation, earnings, operating costs and other factors entering into rate-making questions. The special master will make a report of his findings to Judge Hutcheson, who will then render final judgment.

Mayor B. F. Holcombe says the city will fight to the end any effort of the traction company to secure a fare increase through the courts. The city will employ traction experts to make surveys of the company's property and fix valuations thereon and to examine the company's books and make report of earnings and operating costs. Among the things to be attacked by the city will be the traction company's valuation figures, it being contended by the city that the valuation is fixed too high, and that a fair return would be showed under the present fare, if the property valuation figures were placed at the proper level.

Buses Now Operating in Grand Rapids

Six Fifth Avenue Coach Company passenger buses, type J, of the single-deck variety, have been purchased by the Grand Rapids Railway to augment the service being rendered under the new franchise granted the company about a year ago.

Four of the buses now are in daily use on the Alpine-Avenue line, running to the corner of Richmond and Tamarack in the outskirts of the city. The downtown terminal of this auxiliary line is opposite the new Rowe Hotel, situated at one of the most prominent street crossings in the business district.

In traversing the route from the Rowe to the city limits terminal, the buses penetrate an industrial section hitherto without any transportation service. Nearing the outskirts, the buses pass through a residential district. Opposite the city limits terminal is situated the new Richmond municipal playground, which the city plans to make one of its chief amusement and recreation centers.

Fares are the same as on the railway lines and transfers are issued exactly as on city street cars. The rate is 10 cents a single ride with seven tickets sold for 50 cents.

Five-Cent Fares to Continue.—Five-cent car fares for passengers having identification cards and 10-cent fares for those who do not obtain cards, will be in effect for another year in Muscatine. A contract to this effect between the city of Muscatine and the Clinton, Davenport & Muscatine Railway, was renewed by the City Council for another twelve months.

Agree on Rate.—Discontinuance of further proceedings against the Fonda, Johnstown & Gloversville Railroad to bring the rate in West Main Street in Amsterdam to 5 cents in place of the present 8 cents was consented to by Corporation Counsel Fitzjames at a hearing before the Public Service Commission on June 20. The city also consented to the continuance of the present 8-cent fare. No further hearings will be held by the commission.

Two-Cent Rate Continued on Interurban.—A report from Lansing, Mich., says the Public Utilities Commission has directed continuation of the 2-cent-a-mile fare on the Detroit United Railway. The order is said to be based on tentative appraisals and valuation fixed by the commission. The total, including Detroit city and interurban property, was placed at $33,975,613. The commission fixed the value of interurban lines and the value of the use of city lines for interurban purposes at $26,691,320. It is the opinion of the commission the 2-cent fare will return the company 7 per cent of this valuation.

Wants Six-Cent Rate.—The Fairburn & Atlanta Railway & Electric Company, Atlanta, Ga., has applied to the Public Utilities Commission for permission to increase its passenger rate between Fairburn and Atlanta from 5 cents per zone to 6 cents. The company operates passenger-carrying gas cars between Atlanta and Fairburn. The company was formerly granted permission by the commission to increase its zone charge to 7 cents, but in order to meet the jitney competition voluntarily reduced its rate to 5 cents. Later the company itself operated a number of buses in competition with the independent jitneys, and the result of the rivalry has been that both sides have lost money. It is now claimed that the rival jitneys have been forced out of the business by reason of their losses. The company now proposes to discontinue its own motor buses and revert to the old method of handling all the traffic on its gas cars. It claims that it is necessary to charge the 6-cent rate in order to operate at a profit.

Personal Items

H. S. Clark Promoted by Westinghouse Brake Company

Horace S. Clark has been appointed Pacific district manager of the Westinghouse Traction Brake Company, to succeed C. P. Cass, who has resigned to devote more time to the Westinghouse Pacific Coast Brake Company, of which he is president. Mr. Clark, who was assistant manager of the Pacific district, will continue to maintain headquarters in San Francisco. Before going to the Pacific district, Mr. Cass had been located in St. Louis as Southwestern district manager and president of the Safety Car Devices Company. Both Mr. Clark and Mr. Cass have a wide acquaintance among railway men throughout the country. The Westinghouse Traction Brake Company has also announced the appointment of E. R. Fitch as Southwestern district engineer, with headquarters in St. Louis. Lawrence Wilcox, mechanical expert at Chicago, has been promoted to representative and transferred to the office at Columbus, Ohio. S. T. Reid succeeds Mr. Wilcox in Chicago.



H. S. Clark

Changes Made in East Penn Electric Company

Samuel H. Sarena, the new superintendent of the railway department of the East Penn Electric Company, first became identified with the electric railway business in May, 1899, when he entered the employ of the New York & Queens County Railway, later becoming superintendent of this property. This system was one of the large ones in Greater New York and, previous to the Interborough Rapid Transit Company's operating its trains in Queens, served most of the Borough of Queens, operating 300 cars daily. In December, 1907, Mr. Sarena entered the employ of the Public Service Commission of New York State in the transit bureau. He remained there until Aug. 1, 1909, when he was reappointed superintendent of transportation of the New York & Queens County Railway. He remained in this capacity until Feb. 1, 1923, when he became superintendent of railways of the East Penn Electric Company, with headquarters at Pottsville. This company is controlled by the J. G. White Management Corporation of New York.

Along with the announcement of Mr. Sarena's acceptance of the above-mentioned post came the news that Samuel Cochrane of the East Penn Electric Company had been promoted to the position of superintendent of maintenance of the railway department.

L. C. Bewsey Leaves Michigan United

L. C. Bewsey, superintendent of the Michigan United Railways at Kalamazoo since July, 1921, severed his connections with that company and on June 16 became general manager for the holdings in Cuba of the Electric Bond & Share Company of New York. His headquarters are in Santa Clara. Mr. Bewsey has been associated with electric railways since 1899, when he became identified with the Lafayette Street Railway. He remained with this company until 1904, when he was made superintendent of the Union Traction Company of Indiana at Indianapolis. Ten years later he took on the work of general superintendent of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y. From 1917 to 1921 Mr. Bewsey was engaged in the Philippine Islands in the capacity of superintendent of transport and motive powers for the Manila Electric Company and for one year as electrical engineer in charge of estimates, designs and construction for the engineering department of the Pacific Commercial Company. He left the last mentioned position to become superintendent of the Michigan United Railways, which he held up to June 15 of this year.

James Dalrymple, general manager of the Glasgow Corporation Tramways, expects to visit the United States in September and to prolong his stay so as to permit him to attend the convention of the American Electric Railway Association in Atlantic City in October. Mr. Dalrymple will be accompanied by Mrs. Dalrymple. In a combined business and pleasure trip they expect to travel across the country as far as Vancouver.

James H. Mulligan, car inspector of the United Traction Company, Albany, has resigned to join his son in business. Mr. Mulligan has been in the service of the company for thirty-three years, during which time he worked under six general managers. His first job was changing horses on the cars. In 1890 he was appointed conductor and in 1892 was promoted to inspector. He held this position until Aug. 14, 1897, at which time he was promoted to chief inspector. Later, when J. F. Hamilton was made general manager of the company, the position of chief inspector was abolished and Mr. Mulligan went back to the old position of plain inspector.

E. E. Carpenter Appointed Chief Engineer in Vancouver

E. E. Carpenter has been appointed chief engineer of the British Columbia Electric Railway, Vancouver, B. C., and has already assumed his new duties. Following his graduation from Stanford University in 1898 with the degree of B. S. in civil engineering, he filled successfully various railway engineering positions for some seven years. He served at one time as chief engineer for Sanderson & Porter, in charge of the design and construction of the power development installation — 5,000 hp., initial—for the British Columbia Electric Railway at Jordan River, Vancouver Island, Canada. As a member of the firm of Baker & Carpenter, engineers, San Francisco, he engaged in general consulting and executive engineering practice. Among the major projects undertaken by that firm and with which Mr. Carpenter was connected was the shipbuilding plant at Raymond, Wash., for Sanderson & Porter. Mr. Carpenter is a member of the American Society of Civil Engineers, the American Association of Engineers as well as a member of the firm of Baker & Carpenter.



E. E. Carpenter

C. Melvin Sharpe has been made executive assistant to President William F. Ham to assist particularly in the direction of the activities of the Washington Railway & Electric Company. Mr. Sharpe formerly was associated with the Chamber of Commerce of the United States, but comes to his new position from the La Salle Extension University of Chicago.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Record Production of Hard Coal

The revised estimate of the Department of the Interior for anthracite production in May, based on final data on shipments, places the total at 8,573,000 net tons, including mine fuel, local sales and the product of washeries and dredges. Output during May has only twice, in 1917 and in 1918, exceeded this figure, which is 6 per cent above the average for the eight years 1914 to 1921. The total production of anthracite in the first five months of the present calendar year was 42,504,000 net tons, which is the maximum production recorded for a like period, and is 15 per cent more than the average for eight years preceding 1922.

Properties of a Good Wood Preservative

To protect wood from decay a preservative must first of all be poisonous to wood-destroying fungi. Decay in wood, according to the American Wood Preservers' Association, is not due to direct chemical action, or action of the elements, but is always the result of the activity of low forms of plant life which feed on the wood and thus destroy it.

The preservative must also be able to penetrate the wood sufficiently to form a continuous exterior treated shell deeper than any surface checks which are likely to develop, and to retain its toxicity, or poisoning power, under service conditions.

Electric Steel Founders Standardize Practices

At a recent meeting in Pittsburgh of the several companies which constitute the Electric Steel Founders' Research Group a standard set of trade practice rules was adopted. Suitable pattern equipment for economical molding shall be furnished by the customer. The foundry will not be responsible for correctness of pattern equipment, except when such equipment is made for the customer under the supervision of the foundry. Repairs on pattern equipment shall be paid for by the customer except when caused by carelessness of the foundry. Patterns must have distinctive colors to identify separately the core prints, machined surfaces and rough casting. All patterns, core boxes and loose pieces thereof must be properly numbered for identification. All transportation charges on pattern equipment to and from the foundry shall be paid by the customers. The foundry will not carry insurance on the customer's pattern equipment. Free replacement will be made of defective castings if reported and returned to the foundry within a reasonable time. The foundry will not be responsible for any expense on defective castings incurred by the customer. The customer will be charged with the cost of mold and cores discarded by the foundry due to change in patterns or core boxes.

Progress Is Slow in Lamp Standardization

In spite of the clearly defined tendency toward standardization of commercial products during recent years, little progress in this direction has been made so far as the manufacture of electric lamps is concerned. Commercial installation of incandescent electric lamps began in 1880. A few years later, after the first central station generating and selling current had been built in New York City, there were only two standard lamps, of 8 cp. and of 16 cp. Twenty years ago about a dozen types were being made. Today there are more than 200 standard types of lamps, exclusive of the miniature sizes. Although it might appear from this that no progress whatsoever is being made in the direction of lamp standardization, nevertheless the situation is not really so bad as that, and manufacturers say that it may reasonably be hoped that in the not distant future steps will be taken materially to reduce the number of standard types.

There are today several thousand different types of lamps that are occasionally manufactured. In spite of this situation, and the existence of 200 standard types already mentioned, nevertheless the fact remains that about 90 per cent of the total demand is now covered by twenty lamp types. This factor has aided materially in reducing the cost of lamp manufacture.

A further reduction in the number of types of electric lamps in common use may be expected, manufacturers say. It has been proposed that the more important lamps, which are sometimes called the "bread and butter" types, now made in 10, 15, 25, 40, 50 and 60-watt sizes, be standardized to three sizes each for the Mazda B and for the Mazda C. The scheme is that in the future Mazda B lamps shall be manufactured in sizes 15, 25 and 50 watts only. Mazda C lamps are to be manufactured in sizes of 50, 75 and 100 watts.

Because of this economic advantage such standardization of commercial lamp sizes should have a definite appeal to the general public. Centralization of production, which has resulted in material saving in the cost of manufacture, is impractical in the lamp business. In order that shipment of these fragile articles shall be reduced to a minimum distance it is necessary that each factory manufacture all the different types of lamp.

Price of Food Has Doubled in Past Decade

As compared with the average cost in the year 1913 the cost of food in May, 1923, was 53 per cent higher in Richmond, 51 per cent in Washington, D. C.; 49 per cent in Baltimore, Detroit, New York, Philadelphia and Scranton, 48 per cent in Birmingham, Chicago and Providence, 47 per cent in Boston, Buffalo and Charleston, 45 per cent in Fall River, Manchester, Milwaukee and Pittsburgh, 44 per cent in Minneapolis and St. Louis, 43 per cent in Cleveland and New Haven, 41 per cent in Atlanta, Cincinnati, Dallas, Newark, New Orleans and Omaha, 40 per cent in Indianapolis and Kansas City, 39 per cent in Little Rock, 38 per cent in San Francisco, 37 per cent in Los Angeles, 36 per cent in Jacksonville, Memphis and Seattle, 34 per cent in Louisville, 33 per cent in Denver, 29 per cent in Portland, Ore., and 22 per cent in Salt Lake City. Prices were not obtained from Bridgeport, Butte, Columbus, Houston, Mobile, Norfolk, Peoria, Portland, Me.; Rochester, St. Paul, Savannah and Springfield, Ill., in 1913, hence no comparison for the ten-year period can be given for these cities.

General Electric Company's Business Grows

The General Electric Company reports that it has booked during the first five months of the present year new business amounting to approximately $143,000,000. In 1922 this company billed out slightly more than $200,000,000 worth of goods, or about $16,600,000 a month. For the first four months of 1923 outgoing shipment averaged about $20,000,000 a month in value. Much large equipment which has been for a long time in process of manufacture will soon be shipped, and it may be expected that the coming months will show an even greater volume of business.

Metal, Coal and Material Prices

Metals—New York	June 26
Copper, electrolytic, cents per lb	14.687
Copper wire base, cents per lb	18.00
Lead, cents per lb	7.00
Zinc, cents per lb	6.12
Tin, Straits, cents per lb	40.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.625
Somerset mine run, Boston, net tons	2.625
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	1.80
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.50
Weatherproof wire base, N. Y., cents per lb.	18.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.11
White lead, in oil (100-lb. keg), N. Y., cents per lb	13.125
Turpentine, (bbl. lots), N.Y., per gal	$.95

Hot Air and Electric Heating Compared

Maker of Hot Air Apparatus Furnishes Figures Which Show Decided Advantage in Economy for Coal System

AN ARTICLE which appeared in the Manufactures & Markets Department of the JOURNAL for June 16 pointed out that there has been an increasing activity in the market for electric heaters for cars. In the discussion of contributing conditions for this tendency, the high price of coal and the increased amounts paid for labor were mentioned as reasons for increased interest in electric heating. In this connection, a large manufacturer of hot-air heating equipment points out that there is still considerable margin of economy in favor of heating by hot air as compared with electric heating and has furnished some figures to show actual and estimated heating expense by the two systems for comparison.

Table I is a tabulation of actual costs for heating by hot air for an electric railway operating 271 double-truck cars in a northern climate where extreme winter conditions prevail. The average total cost per car per season when heating with hard coal and air heaters is shown to be $190.72, including interest and depreciation. This is compared to tests made with electric heaters on cars of corresponding size and with similar climatic conditions, showing an average cost in excess of $400 per car per season of 160 days, exclusive of interest and depreciation.

The last item of $40 per car per season for attendance and handling fuel is considered by the manufacturer to be about 40 per cent too high as judged from the similar item on other properties. It is attributed to an expensive method of handling in which changes are to be made next winter.

Table II gives test data from a Pennsylvania property for electrically heating a Peter Witt car, 46 ft. 3 in. long by 8 ft. 2 in. wide, using sixteen electric heaters with thermostatic control and hand operated ventilators. The actual energy consumption of the heaters was measured with a Sangamo watt-hour meter and the test covered the period from Jan. 8 to April 2, 1923, during which the car was out of service fourteen days. The average mean temperature during the period was 27 deg. F., average maximum temperature of 33 deg. and average minimum of 21 deg. Estimated costs for heating the same car by means of coal are given in the lower part of the table.

Table III gives similar test data from the same railway for heating a single-truck, one-man car, 26 ft. 2 in. long by 7 ft. 8 in. wide, using twelve electric heaters without thermostat. The energy consumed by the heaters was measured by a Sangamo watt-hour meter and the test extended over the period from Jan. 8 to March 12, 1923. The average mean temperature during the period was about the same as given above for the data of Table II. For comparison the estimated cost of heating this car with coal is printed in this case also, as a part of Table III.

In both these test cases, the meters were installed and the data collected by the railway and a copy of the report furnished weekly to the manufacturer.

TABLE I—ACTUAL EXPENSES FOR HEATING CARS—SEASON FROM AUGUST 1, 1921, TO JULY 31, 1922

Month 1921	Fuel for Heating	Labor Heating Cars	Maintenance of Equipment: Stove	Motors	Stacks	Hot-Water Heaters	Total Expense for Season
August.....	12.55	36.89	7.76	196.13	2.40	.....	255.72
September..	0.93	19.90	302.76	561.93	58.96	.....	944.48
October....	.....	101.98	486.92	549.77	386.00	.....	1,524.67
November..	228.47	1,630.92	569.08	523.01	136.20	68.84	3,156.52
December..	7,750.89	2,086.35	30.85	81.21	1.66	177.23	10,128.19
1922							
January....	6,579.87	2,083.37	149.21	94.91	17.34	140.61	9,065.31
February...	5,796.28	1,828.78	107.07	94.05	27.06	66.04	7,919.28
March.....	4,290.88	2,004.29	64.55	125.36	0.75	27.66	6,513.49
April.....	1,125.64	628.38	4.86	25.73	1.35	4.92	1,790.88
May.....	.....	18.82	0.60	.....	29.93	.....	49.35
June.....	67.80	.....	.....	.....	1.12	.....	66.68
July.....	.....	59.64	6.68	.....	3.71	.....	70.03
	25,717.71	10,499.32	1,730.34	2,252.10	666.48	485.30	41,351.25

271 cars in operation—Double-truck. Body 34 ft. inside bulkheads.

Average operating cost per car per season	$152.59
Add for operation of blower motor per car 810 kw.-hr. at 0.00695 (estimated)	5.63
Add interest at 6 per cent on $250 cost of equipment per car	15.00
Add depreciation at 7 per cent on $250 cost of equipment per car	17.50
Total	$190.72
Fuel consumption per car per season	4.8 tons
Cost of anthracite coal per ton	$19.80
Maintenance of heating equipment per car per year	19.00
Attendance and cost of handling and distributing fuel per car per season	40.00

TABLE II—TEST DATA FOR ELECTRIC HEATING OF PETER WITT TYPE CAR WITH ESTIMATE OF COST TO HEAT SAME BY COAL

Car-hours operated during test period	952.37
Car-miles operated during test period	8,605.22
Kilowatt-hours consumed during test period	13,070.
Kilowatt-hours consumed per car-hour	13.72
Kilowatt-hours consumed per car-mile	1.285
Total cost of current for electric heat during test period of seventy days = 13,070 kw.-hr. x 1.4 cent	$182.98
Average cost of current per car-hour = 13.72 kw.-hr. x 1.4 cent	0.1921
Average cost of current per car-mile = 1.285 kw.-hr x 1.4 cent	0.018
Average cost of current per car-day =	2.61
Average cost of current per car per season of 160 days on the above basis	417.60
No items of interest, depreciation, maintenance or heater haulage included.	
The average cost of heating by a hard coal-fired hot-air heater, during the period of electric heating test is estimated as follows: (Car out of service fourteen days).	
Total thermal value of 13,070 kw.-hr. consumed during the electric heat test period of seventy days =	44,594, 840 B.t.u
Quantity of 13,000 B.t.u. per pound hard coal required to produce 44,594,840 B.t.u. = 3,430 lbs. at 100 per cent efficiency of heater.	
Efficiency of heater is actually about 50 per cent; therefore total quantity of coal required, would have been 6,860 lb. or	3.43 net tons
Fuel cost—heating car while in service = 3.43 net tons at $13.00 per ton delivered	44.59
Fuel cost—banking fires, while car is not in service = 2 lb. coal per hour, twelve hours per day for seventy days = 0.85 net ton at $13 per ton delivered	11.05
Kindling and kerosene—lighting fires at 2 cents per day x seventy days	1.40
Attendance—labor kindling fires, removing ashes, etc., at 15 cents per day x seventy days	10.50
Cost of power—to operate blower motor—250 watts per hour x eleven hours per day x seventy at 1.4 cents per kilowatt-hour	2.70
Maintenance—952 car-hours at 0.75 cents per car-hour	7.14
Stove haulage—8,605 car-miles x 315 lb. (weight of heater) + 2,000 lb. = 1,350 ton-miles at 0.3475 cent	4.69
Total cost for seventy days	$82.07
Average cost per car-hour	$0.086
Average cost per car-mile	0.0095
Average cost per car per day	1.17
Average cost per car per season of 160 days	187.20

TABLE III—TEST DATA FOR ELECTRIC HEATING OF SINGLE-TRUCK ONE-MAN CAR

Car-hours operated during test period	1,012.
Car-miles operated during test period	8,505.
Kilowatt-hours consumed during test period	8,115.
Kilowatt-hours consumed during test period per car-hour	8.02
Kilowatt-hours consumed during test period per car-mile	.954
Total cost of current for electric heat during test period of sixty-three days = 8,115 kw.-hr. at 1.4 cent	$113.61
Average cost of current per car-hour 8.02 kw.-hr. x 1.4 cent	0.1123
Average cost of current per car-mile 0.954 kw.-hr. x 1.4 cent	0.0134
Average cost of current per car per day $113.61 ÷ sixty-three days	1.80
Average cost of current per car per season of 160 days on the above basis	288.00
No items of interest, depreciation, maintenance or heater haulage are included.	
The operating cost of heating car with hot-air heater during the sixty three-day test period would have been about as follows:	
Thermal value of 8,115 kw.-hr. consumed in electric heating of car during the sixty three-day test period =	27,688,380 B.t.u
Quantity of 13,000 B.t.u. per pound hard coal required to produce 27,688,380 B.t.u. = at 100 per cent efficiency of heater	2,130 lb.
Efficiency of heater is actually 50 per cent; therefore total quantity of coal required would have been 4,260 lb. or	2.13 net tons
Fuel cost—heating car while in service = 2.13 tons hard coal at $13 per ton delivered	$27.69
Fuel cost—banking fires when car is not in service = 2 lb. coal per hour at eight hours per day x sixty three days = 1 ton hard coal at $13 per ton delivered	6.50
Kindling and kerosene for lighting fires at 2 cents per day. =	1.26
Attendance—labor kindling fires, removing ashes, etc., at 15 cents per day x sixty three days	9.45
Cost of power—to operate blower motor = 250 watts per hour x 16 hours per day x sixty three days = 252 kw.-hr. at 1.4 cents	3.53
Maintenance—1,012 car-hours at 0.75 cents per car-hour	7.59
Stove haulage—8,505 car-miles x 315 lb. (weight of heater) + 2,000 lb. = 1,334 ton-miles at 0.375 cents	5.00
Total cost for sixty three days	$61.02
Average cost per car-hour	$0.06
Average cost per car-mile	0.0072
Average cost per car per day	0.97
Average cost per car per season of 160 days	155.20

Rolling Stock

Long Island Railroad, New York, N. Y., announces that of the ninety-two new steel passenger cars on order twenty-one have thus far been delivered. The company also reports that the contractors are making rapid progress with the seventy-one steel cars under construction and scheduled for delivery this year.

San Francisco Municipal Railway on June 20 received the first of the twenty cars which are being built for it by the Bethlehem Shipbuilding Corporation at San Francisco. Owing to the steady increases in traffic, San Francisco's Municipal lines now have barely enough cars to maintain service with the minimum number of spares in repair and paint shops. This has been due to the rapid building up of outlying residential districts. In the Richmond district the traffic has increased 60 per cent since 1914 and in other districts increases of 70 per cent or more have been recorded since the Municipal system has been in operation.

Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, as was announced in the June 23 issue of this paper, has purchased four new passenger cars. The specifications for these cars are as follows:

Builder of car body	Kuhlman Car Company
Seating capacity	56
Total weight	34,500 lb.
Bolster centers, length	24 ft. 6 in.
Length over all	47 ft. 6 in.
Width over all	8 ft. 6¼ in.
Body	Steel
Interior trim	Cherry
Headlining	White
Roof	Arch
Air Brakes	G. E.
Armature bearings	Ball
Control	"K"
Curtain material	Pantasote
Designation signs	Hunter
Gears and pinions	G. E.
Hand brakes	Peacock
Heater equipment	Consolidated
Headlights	G. E.
Lightning arresters	G. E.
Motors	G. E. 264. Inside hung
Seats	Brill
Seating material	Brown imitation leather
Trucks	Brill 77E
Wheels	Rolled steel 26 in. x 3¼ in.

Track and Roadway

Mississippi Valley Electric Railway, Iowa City, Ia., expects to build 1,700 ft. of new track and to pave 1,200 lin.ft. of track.

Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, is stringing 30 miles of high-tension wire between the Toledo city limits and Port Clinton.

Johnstown & Somerset Railway, Somerset, Pa., contemplates extending its line to Jerome, a distance of 5 miles. Work on the extension will be started on Aug. 1.

Seattle Municipal Railway recently awarded to the Pacific States Electric Company, Seattle, the contract for furnishing 10 miles of No. 2 hard-drawn, round copper trolley wire in 1-mile reels. The contract totals $4,020.

Laredo (Tex.) Electric & Railway Company, is preparing to extend its lines to give service to many portions of the city of Laredo not now served. Workmen are now laying track on Matamoros Street for an extension of one of the lines. Approximately $250,000 will be spent in extensions.

Department of Street Railways, Detroit, Mich., has started construction on two new extensions of the municipal system, the Linwood and Warren Avenue east lines. Plans are also made for an extension on Warren Avenue west. The Linwood extension from the present line at Joy Road to Davison Avenue will include about 1½ miles of double track and the East Warren extension from Bewick Avenue to St. Jean Avenue will include about ½ mile of double tracks.

Power Houses, Shops and Buildings

Springfield (Mass.) Street Railway is about to construct a new office building in Westfield. It will be of brick and will cost $5,630.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order from the Brazilian Hydro-Electric Company, Ltd., a subsidiary of the Brazilian Traction, Light & Power Company, Ltd., of Rio de Janeiro and São Paulo, Brazil, for seven power transformers and a large amount of switching equipment for a new plant located on the Parahyba River, about 100 miles northeast of Rio de Janeiro.

Trade Notes

Stone & Webster, Inc., have been engaged to supervise the construction of the Paducah Electric Company's $400,000 electric generating plant.

A. Gilbert & Sons Brass Foundry Company, St. Louis, Mo., announces that it has just doubled the size and capacity of its machine shop to take care of its growing business.

Magnus Electric Company, Inc., New York, N. Y., manufacturer of electrical specialties, wiring devices and radio accessories, has established a new district sales office at 231 North Wells Street, Chicago. The office is in charge of Leo Hirschfeld and M. B. Geiger.

Dr. W. R. Whitney, director of the research laboratory of the General Electric Company, was recently elected a member of the corporation of the Massachusetts Institute of Technology for a term of five years. He was graduated from the Massachusetts Institute of Technology in 1890 and has been for some time a non-resident professor of theoretical chemistry at that institution.

Roller-Smith Company, 233 Broadway, New York, N. Y., announces the appointment of H. D. Baker, 525 Woodward Avenue, Detroit, as its representative in the State of Michigan. Mr. Baker will handle the Roller-Smith Company's lines of instruments, circuit breakers and radio apparatus in that territory. Mr. Baker has been associated with the Roller-Smith Company in various capacities for several years, knows the company's products well and has a wide acquaintance in his territory.

Peter Smith Heater Company, Detroit, reports a number of recent orders. Among recent orders or shipments are the following: ten heaters, type O-C-2, for the new passenger cars of the Chicago, North Shore & Milwaukee and ten heaters of the 2-P type for the parcel freight cars of the same company, 125 heaters of the 2-P-O type for the Toronto Transportation Commission; fifty heaters of the 2-P-N type for the Cleveland Railway; four heaters of the 3-P-O type for the Chicago & West Towns Railway and fifty of the 3-P-O type for the St. Louis Railways. The company has also supplied many heaters for the gas rail cars used by a number of the steam railroads.

New Advertising Literature

Bethlehem Shipbuilding Corporation, Ltd., Bethlehem, Pa., has issued a new sixty-five-page catalog on pumps for feed and other duties. The catalog also contains a description of the corporation's line of pumps for handling oil.

Conveyors Corporation of America, Chicago, has just issued an eight-page booklet, "Representative Installations." It contains illustrations of a number of buildings and power plants which are equipped with the company's American steam jet ash conveyor, a method of ash removal which has come into marked favor among power plant engineers during the past four or five years. Copies will be sent to any who are interested in the steam jet method of ash handling.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued its 1923-1924 supply catalog. In appearance the new catalog does not differ greatly from its predecessor. The former editions have proved so useful and satisfactory that no essential features were altered, the improvements being largely a matter of detail and refinement. The catalog is indexed according to subjects and to sections, and also has a style number and a thumb index. In addition, a new feature—a classified index—has been added to the introductory section under the title "How this catalog serves." Here is listed apparatus of particular interest to central stations, electric railways, industrial plants, mines, contractor-dealers and architects. The catalog announces the opening of a new plant at Homewood, Pa. In all, 1,300 pages are devoted to descriptive matter, technical data, dimension drawings, specifications and prices. The material includes all new apparatus developed in the last two years.



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THE A. B. C.

—*An Aid to Advertisers Both Local and National*

THE Audit Bureau of Circulation is an Association of publishers, advertisers and advertising agencies who are co-operating to standardize and verify circulation data, and thus place the buying of space on a basis of "Known Value."

The Bureau was established in 1914 and now numbers among its members the majority of the leaders in the publishing and advertising fields of the United States and Canada.

Twice a year the publisher makes a report to the Bureau showing total circulation and details of distribution by states, cities, towns, suburbs and rural districts; also subscription rates and facts about contests, premiums and club offers. Once a year these statements are audited by one of the Bureau's experts. The publisher-members agree to permit examination by the Auditor of all records considered necessary by the Bureau.

By means of the A. B. C. audit reports, which are issued on all member-publications, the advertiser can analyze the circulation of a publication and determine its value to him as an advertising medium.
By patronizing A. B. C. publications, advertisers guard their own interests and also participate in this nation-wide movement to place advertising on a sound, business-like basis.

The Electric Railway Journal is a member of the A. B. C. and would be pleased to submit a copy of the latest circulation report

INVEST YOUR ADVERTISING DOLLARS BY USING A. B. C. PAPERS

Restore the rail-head with



The Reciprocating Track Grinder

It develops the maximum life of track

Corrugations are probably the greatest single factor hastening track toward a too early destruction. The Reciprocating Track Grinder is the most successful equipment in combatting this tendency. It will remove corrugations without leaving a trace. Furthermore, it removes the very least possible metal to accomplish this result. Long grinding blocks used which conform themselves to the original shape of rail head without special dressing. They cover several waves of corrugation at once and thus they only grind the high spots. This basic principle of corrugation grinding is found only in our Reciprocating Track Grinder.



"Atlas" Rail Grinder

The Atlas Rail Grinder

is the other type—with rotating grinding wheel—especially suitable for removing surplus metal after welding. It is light and fast, easily operated by two men, and quickly removable from track to permit cars to pass.

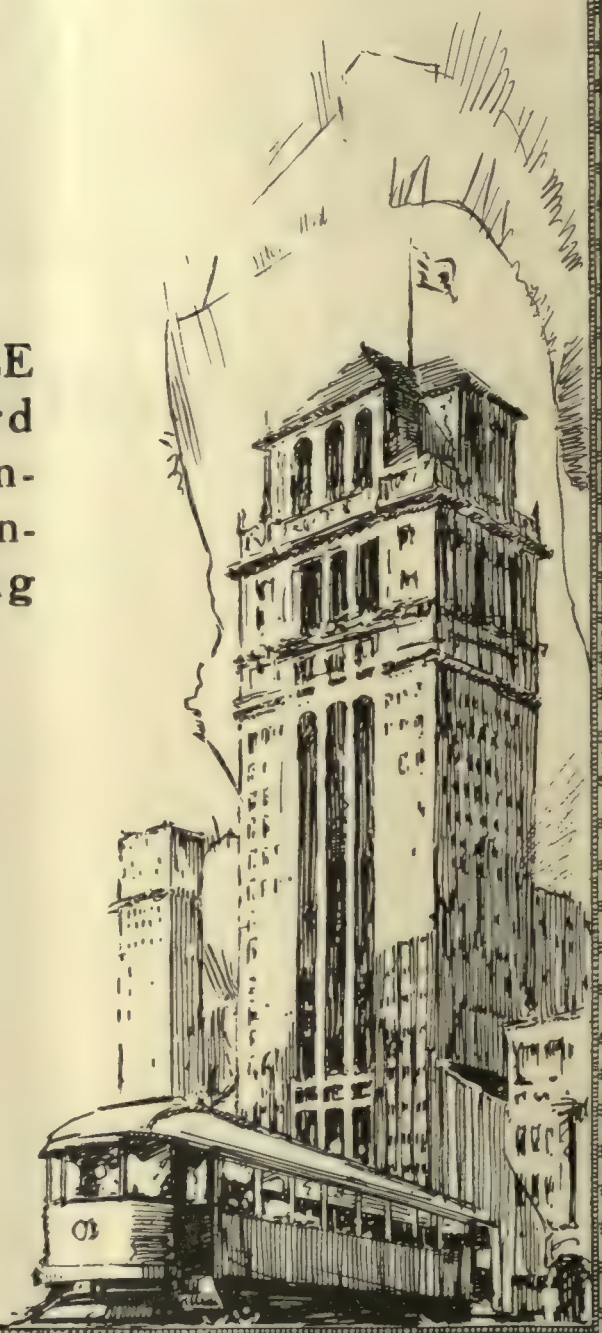
Railway Track-work Company

3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS:

Chas. N. Wood Co., Boston — Electrical Engineering & Mfg. Co., Pittsburgh — Atlas Railway Supply Co., Chicago — P. W. Wood, New Orleans — Equipment & Engineering Co., London

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED

CANDLER BLDG NEW YORK



As we understand cooperation

(Taking the power plant as an example)

Your Chief Engineer knows his units.

Texaco Lubrication Engineers know lubricants and they understand their application to prime movers and machines.

Get these two together. Let them talk things over.

And then the Texaco Lubrication Engineer sent out on the job will submit a list of recommendations covering the right oil for each particular unit or machine and the correct application and quantities for most efficient service.

He will show you the most gratifying kind of cooperation through your chief engineer.

The two of them, working together, will show you almost unheard of operating economy in your power plant.

So, then, let us get together to save costs when you *make* power, and to save money when you *buy* it.

That is the net result of Texaco Lubrication Service.

Probably we don't have to say this, but it may be worth while calling it to your attention. "The same high quality, which has put and kept Texaco Lubricants on the cars of many of the most carefully conducted Roads is equally apparent in TEXACO TURBINE OILS, TEXACO STEAM CYLINDER OILS, TEXACO ENGINE OILS, TEXACO GREASES."

TEXACO

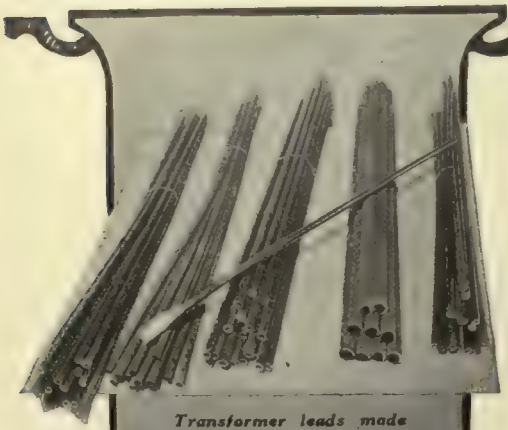
THE TEXAS COMPANY

TEXACO

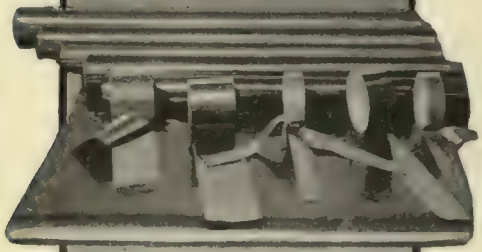
DEPT. R-J - 17 BATTERY PLACE - NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES

IRVINGTON INSULATION

Means Longer Life for Electrical Equipment



Transformer leads made in all sizes and strengths.



Varnished paper—1, 2 and 3 ply for condensers, small armatures, radio transformers, coils, ignition, and instrument work.



Cellulak, Laminated shellac construction, transformer bushings, insulating sleeves, and tubes up to 30 in. diameter.

Since 1905, the Irvington Insulator & Mfg. Co. has been the leading manufacturer of varnished insulating products. As a result, today the majority of high tension insulated wires and cables are protected by Irvington black varnished cambric.

To maintain its leadership as the largest manufacturer of varnished cambric in the world, this company has continually improved its products and enlarged its line.

Hence Irvington Products now meet your requirements 100%. They include every kind of insulation manufactured: cloth, paper, liquid, tubular and solid.

Irvington Products are manufactured in its new brick and reinforced concrete plant—fire-proofed throughout to insure the user a continuous supply of varnished insulation.

For samples and prices, write our nearest sales representative.

Irvington Products

- Varnished Silk
- Varnished Paper
- Black and Yellow Varnished Cambric
- Straight and Bias Varnished Cambric Tapes
- Flexible Varnished Tubing
- Special Folded Paper for Coil Windings
- Transformer Leads
- "Cellulak"
- Special Adhesive
- High Dielectric Paper
- Insulating Varnishes and Compounds
- "Irv-O-Slot" Insulation

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electric Supply Co., St. Louis
E. M. Wolcott, Rochester
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto

Reliable Brushes *for* Electric Traction



To obtain uniformly excellent results from standard railway motors with slotted commutators on both city and interurban service

USE GRADE NO. 402

NATIONAL CARBON COMPANY, INC.
Cleveland, Ohio San Francisco, Cal.

Stopping at every block!



BOYERIZE city cars for safety!

And not only for safety but for economy! The glossy armor plate surface of BOYERIZED Brake Parts actually gives three to four times the wear of ordinary case-hardened steel. Yet their toughness is not impaired. Long life and the greatest possible insurance against accident go hand in hand when BOYERIZED parts are concerned. Isn't it worth while to BOYERIZE right now?



The McArthur Turnbuckle

For illustration take the new McArthur Turnbuckle. Saves time, because it requires only a small hand wrench to get a grip that can't loosen. A full tooth exposed at the end on each half serves as an ice and mud cutter—no binding—no damaged threads. And it wears as long as the truck because—it's BOYERIZED.

Other BOYERIZED Parts

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
McArthur Turnbuckles
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



Bates Steel Poles and Public Interest

Do your installations favorably impress and interest the investing public?

The stability of your installation, using Bates Steel Poles as the ***backbone*** of your construction, will reflect the solidity of your organization.

You will find Bates Steel Pole installations lower in initial costs than constructions built with substitute poles.



Bates engineers will gladly co-operate with you in your planning

Bates Expanded Steel Truss Co.

ILLINOIS MERCHANTS BANK BLDG., CHICAGO, ILL.

BATES ONE PIECE EXPANDED STEEL POLES



PRACTICALLY all gears make a good showing in their advertising but the real story of comparative quality is found in their service records. Nuttall BP gears have made many, many records which have never been equalled.

Ask the man who uses them.

AERA 1923

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

EVERY GEAR REGISTERED

Nuttall

ELECTROSE
TRADE MARK
REG. U.S. PAT. OFF. & FOREIGN COUNTRIES.



No. 94424

The ideal insulation material for

Electric Railway Insulators

Electrose Insulation needs no introduction. It has long since proven its undoubted superiority from the standpoint both of electrical efficiency and resistance to wear or disintegration.

Our stocks of electric railway standard parts are complete. However, should your requirements demand special designs, our plant is at your service.

Consult us. Bulletins on request.



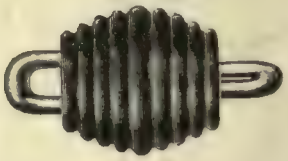
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No. 16925



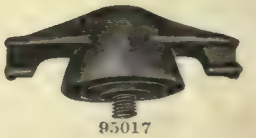
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No. 10



No. 31997



95017

ELECTROSE MFG. CO.

60-82 Washington St.
66-76 Front St.

27-37 York St.
1-23 Flint St.

Brooklyn, N. Y.

New England Agents:
CRANE-STOUT, Inc.
10 High Street, Boston

This Paper is a "Member *of the* A.B.P."

To you, this is a fact of especial significance, for it means that this publication is part of a concerted movement to raise the level of publishing practice, to assure better service to both subscribers and advertisers.

The "A.B.P." is built upon and revolves around the following set of standards —

STANDARDS *of* PRACTICE

THE publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself—

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation statements, subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

Publications which have subscribed to these standards have earned the preferred consideration accorded them.

THE ASSOCIATED BUSINESS PAPERS, INC.
220 West 42nd St., New York

—then they ordered fifty (50) more!



St. Louis Quality Cars

So satisfactory was the service of this type of car on the Hollywood lines of the Pacific Electric Railway, that they placed a repeat order, making a hundred in all.

Let us figure on your new cars.

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"



The COLUMBIA Armature and Field Coils

—fit correctly in the armature slot, thus avoiding abrasion through winding or through vibration in service.

COLUMBIA 18 92 MACHINE WORKS

3313 Atlantic Ave., Brooklyn, N. Y.

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg; New York, Pershing Sq. Bldg.

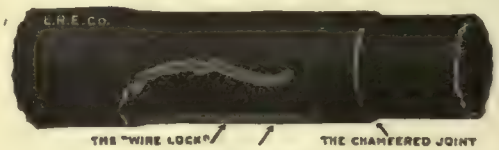
ROME WIRE

BARE AND INSULATED

Rome Merit Wins Customers
Rome Service Holds Them

ROME WIRE COMPANY
Main Plant and Executive Offices: Rome, N. Y.
"Diamond" Branch: Buffalo, N. Y.
DISTRICT SALES OFFICES:
New York, 50 Church St. Chicago, Ill., 14 E. Jackson Blvd.
Boston, Mass., Little Bldg. Detroit, Mich., 25 Parsons St.
Los Angeles, Cal., J. G. Pomeroy, 336 Azusa St. 2113-L

ELRECO TUBULAR POLES



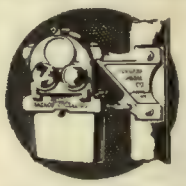
COMBINE
Lowest Cost — Lightest Weight
Least Maintenance — Greatest Adaptability
Catalog complete with engineering data sent on request
ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

We are prepared

to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.
When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tape
THE OKONITE CO., Passaic, N. J.
Incorporated 1884
OKONITE
TRADE MARK.
Sales Offices:
NEW YORK ATLANTA
SAN FRANCISCO
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders



NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.

ANACONDA TROLLEY WIRE



ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage
Hubbard & Company
PITTSBURGH, PA.



INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY



U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection
United States Electric Signal Co.
West Newton, Mass.

Chapman Automatic Signals

Charles N. Wood Co., Boston



Shaw Lightning Arresters

Standard in the Electric Industries for 35 years
Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches
Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 36-38 Upper Thames St.
AETNA

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new Rail Bond Book

American Steel & Wire Company
CHICAGO
NEW YORK

The Baker Wood Preserving Company

CREOSOTERS

Washington Court House, Ohio

Cross Ties — Bridge Timbers
Lumber — Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

SPECIALISTS
in the
Design and Manufacture
of
Standard—Insulated—and Compromise Rail Joints

The Rail Joint Company
61 Broadway, New York City

International Creosoting & Construction Co.

Galveston, Texas

Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

Series Type

Arc Welding and Bonding Outfit

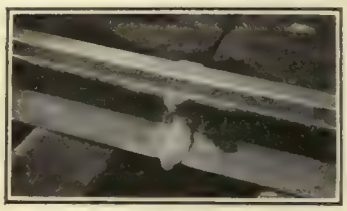
Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS

FERALITE

An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.



Feralite Welded Joint

Special advantages — (1) Rail ends are butted together and easily aligned, no inserts needed to fill in or adjust. (2) Smaller portions of material used. (3) Grinding reduced to the minimum, only a slight touching up is needed.

The Feralite Rail Welding Process eliminates rail joints at a lower cost than any other process. Write for full details.

ALUMINO-THERMIC CORPORATION
Roselle Park, New Jersey

W H A R T O N

Special Trackwork

For Street and Steam Railways

Steel Castings **Gas Cylinders**

ORIGINATORS OF
Manganese Steel Trackwork

WM. WHARTON JR. & CO., Inc.
Easton, Pa.
Other Plants:
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Tioga Steel & Iron Co., Philadelphia, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES
BOSTON, 49 Federal Street
PHILADELPHIA, North American Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

THE BABCOCK & WILCOX COMPANY — STEAM

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES
DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

Lapp Insulators

Lapp Insulator Co. Inc. LeRoy, N.Y.

Trade Mark

STANDARD

Wires, Cables, Cable Accessories
Superior quality, economical prices
Standard Underground Cable Co.
Boston Philadelphia Pittsburgh Detroit
New York Washington Chicago St. Louis
San Francisco

GODWIN STEEL PAVING GUARDS

Adapted to all types of rails and paving.



Proven by service to economically prevent seepage and disintegration of street railway paving.

Write for Illustrated Catalog No. 20.

W. S. GODWIN CO., Inc. 12 E. Lexington St., Baltimore, Md.

RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

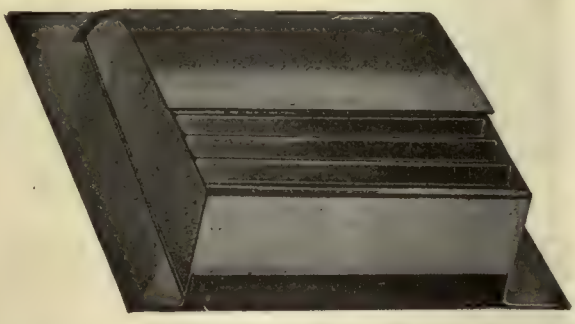
RACOR TRADE MARK

RACOR Tee Rail Special Work.

Manganese Construction

GENERAL OFFICES: HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

VENTILATORS



THE N-L New Style Type C Ventilator is absolutely weatherproof, lies low on roof, looks well and meets every requirement of ventilation.

More than seven thousand N-L Ventilators sold during 1922.

The Nichols-Lintern Company
7960 Lorain Ave., Cleveland, O.

N-L Products manufactured and sold in Canada by
Railway and Power Engineering Corporation, Ltd., 133 Eastern Avenue, Toronto, Ontario

Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Far East. It is therefore to be expected that when Rattan is thought of, our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY
Factory: Wakefield, Mass.

SALES OFFICES:
Heywood-Wakefield Co. 516 West 34th St., New York
Heywood-Wakefield Co. 1415 Michigan Ave., Chicago
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway and Power Engineering Corp., Toronto and Montreal
G. F. Cotter Supply Co., Houston, Texas

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
Alliance, Ohio

MOORE RAPID 'LECTROMELT FURNACES



MAKE YOUR OWN STEEL AND IRON CASTINGS WHEN AND AS YOU NEED THEM

PITTSBURGH ELECTRIC FURNACE CORPORATION
Largest Maker of Arc Furnaces in the World
PITTSBURGH, PA.

TULC A LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

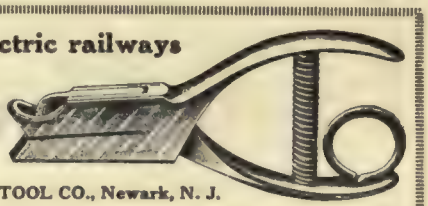
The Universal Lubricating Co.
Cleveland, Ohio

"Make it of Vul-Cot Fibre"

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE

75% of the electric railways use

B-V Punches



Send for Catalog
BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



An Ohmer One Man Car Installation

Ohmer Indicating and Recording Fare Registers apply correct business methods to the sale of electric railway transportation.

OHMER FARE REGISTER CO.
Dayton, Ohio



Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

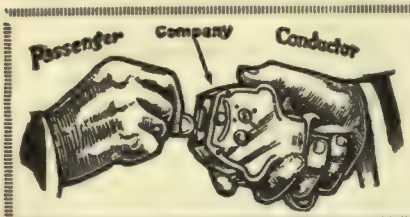
Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois



CLEVELAND FARE BOXES
always
Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario



Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
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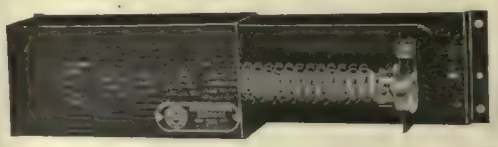
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No. 478E

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MASTER MECHANIC wanted immediately by electric street and interurban railway company in Pennsylvania, operating five to twelve cars and own generating power station. One who can rewind his own car motor armatures preferred. Give full statement of experience, education, age, references, salary expected, and when available. P-572, Elec. Railway Journal, 10th Ave. at 36th St., New York.

ROADMASTER wanted with considerable experience for large property in Central Ohio. P-571, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

TWO master mechanics wanted, 1 for city with 45 city cars, 1 for interurban with 40 interurban cars. Both shops located in the Middle West. Have good shops, tools and machinery. P-567, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

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MASTER mechanic or superintendent of rolling equipment, open for a position in two weeks. Have had charge of all repairs 500 cars. Can get results. 20 years' experience. Age 38. PW-570 Elec. Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of transportation, with a proven successful record of nineteen years on city, suburban and interurban properties, solicits correspondence with managers who are in need of a capable, efficient superintendent; successful in dealing with public and labor; recognized as an operating official who gets results; at present with large property; personal reasons for desiring a change. High grade references furnished as to ability to take over any property and get results. PW-568, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

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BALDWIN ELECTRIC LOCOMOTIVE

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with Angle Bars

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Send your orders to us and deduct 25 per cent from the current quotations.

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Also a 13-foot Long Box Car Trailer

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A very handy, convenient and economical outfit for a small railroad

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ATTRACTIVE PRICE FOR QUICK SALE

1—Buckeye Engine, 18¾ x 18¾, direct connected to General Electric Co.'s generator, Type MP, Class 8-165-240, Form A-2, volts 250/275, generator No. 25826.

1—Buckeye Engine, 18¾ x 18, direct connected to General Electric Co.'s generator, Type MP, Class 8-165-240, Form L, volts 250/275, generator No. 31345.

1—Buckeye Engine, 18¾ x 18¾, direct connected to General Electric Co.'s generator, Type MP, Class 6-165-240, Form R, volts 250/275, generator No. 159425.

1—22 x 36 x 42 cross-compound vertical Corliss Engine, made by Filer-Stowell Co., Milwaukee, Wis., direct connected to General Electric Co.'s 525 kw., 525/575 volt, 100 r.p.m., generator No. 31209.

2—Allis-Chalmers 26 x 36 Corliss horizontal Engines, direct connected to Allis-Chalmers 500 kw., 550/575 volt, 125 r.p.m., generators Nos. 38316 and 38382.

The switchboard equipment for these generators will consist of generator panels only, which includes circuit breaker, ammeter and switches.

Filer-Stowell Engine and Generator available about July 1st, 1923. Allis-Chalmers Units available about August 10th, 1923. All of the above equipment is now in operation in the Pittsburgh district. Address T. S. Duncan, P. O. Box 940, Pittsburgh, Pa.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Electric Service Sup. Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
Barges, Steel
American Bridge Co.
Batteries, Dry
National Carbon Co.
Bearings an Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Westinghouse E. & M. Co.
Bearings Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Bollers
Babcock & Wilcox Co.
Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.
Book Publishers
McGraw-Hill Book Co., Inc.
Brackets and Cross Arms (See also Poles, Ties Posts, etc.)
Bates Exp. Steel & Tr. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.
Bridges, Steel
American Bridge Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
National Carbon Co.
Westinghouse E. & M. Co.
Brushes, Graphite
National Carbon Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Buildings, Steel
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Bus Seats
Hale & Kilburn
Heywood-Wakefield Co.
Cables (See Wires and Cables)
Cambric, Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.
Carbon Brushes (See Brushes Carbon)
Car Lighting Fixtures
Electric Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
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Archbold-Brady Co.
Ceiling, Car
Pantasote Co., The
Change Carriers
Cleveland Fare Box Co.
Circuit Breakers
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Economy Electric Devices Co.
Electric Service Sup. Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Rome Wire Co.
Coils, Choke and Kicking
General Electric Co.
Westinghouse E. & M. Co.
Coin-Counting Machines
Cleveland Fare Box Co.
Electric Service Sup. Co.
Internat'l Register Co., The
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrapping Machines
Cleveland Fare Box Co.
Commutator Slotters
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
Westinghouse E. & M. Co.
Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air, Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor, Papers
Irvington Varnish & Ins. Co.
Conduits, Flexible
Alphaduct Co., The
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car-Heat'g Co.
Electric Service Sup. Co.
Ohio Brass Co.
Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Electric Service Sup. Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
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Copper Wire
Anaconda Copper Min. Co.
Page Steel & Wire Co.
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National Vulcanized Fibre Co.
Cord, Bell, Trolley Register, etc.
Brill Co., The J. G.
Electric Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
Samson Cordage Works
Cord Connectors and Couplers
Electric Service Sup. Co.
Samson Cordage Works
Wood, Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
Cranes
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Cross Arms (See Brackets)
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Ramapo Ajax Corp.
Crossing Foundations
International Steel Tie Co.
Crossing Frog and Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing, Manganese
Ramapo Ajax Corp.
Crossings Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Crushers, Rock
Allis-Chalmers Mfg. Co.
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Electric Service Sup. Co.
Morton Mfg. Co.
Pantasote Co., The
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Electric Equipment Co.
General Electric Co.
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Derailing Switches
Ramapo Ajax Corp.
Destination Signs
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Electric Service Sup. Co.
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Wish Service, P. Edward
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Con. Car-Heating Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
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Brill Co., The J. G.
General Electric Co.
Hale & Kilburn
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
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Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
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Electric Service Sup. Co.
Ears
Ohio Brass Co.
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American Steel & Wire Co.
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Railway Track-Work Co.
Electrodes, Steel
Railway Track-Work Co.
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Holst, Englehardt W.
Jackson, Walter
Kelly Cooke Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Inc., Dwight P.
Sanderson & Porter
Sangster, Andrew & Co.
Stevens & Wood, Inc.
Stone & Webster
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Wortham, Edwin
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Consolidated Car Fender Co.
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Godwin Co., Inc., W. S.
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Carnegie Steel Co.
Columbia M. W. & M. I. Co.
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Ramapo Ajax Corp.
Frogs, Track (See Track Work)
Wharton, Jr., & Co., Wm.
Frogs, Trolley
Ohio Brass Co.
Furnaces, Electric
Pittsburgh Elec. Furnace Corp.
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General Electric Co.
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Railway Track-work Co.
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Railway Track-work Co.
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Ingersoll-Rand Co.
Hand Holds
Central Equipment Co.
Harps, Trolley
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Nuttall Co., R. D.
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Economy Electric Devices Co.
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Incorporated
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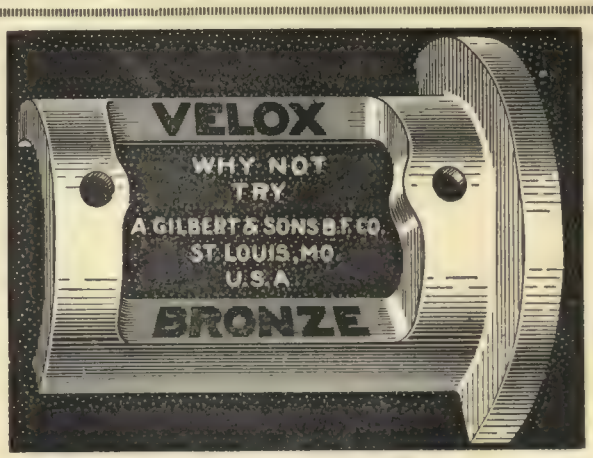


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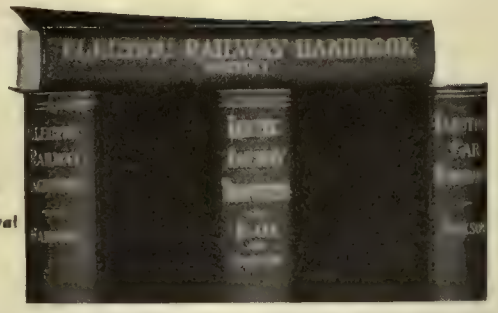
Wednesday

For issue out Saturday

0220



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Sterling Varnish Co.
Westinghouse E. & M. Co.
Helmets, Welding
Railway Track-work Co.
Herault Electric Furnaces
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Insulating Varnishes
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Okonite Co.
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Irvington Varnish & Ins. Co.
Insulators (See also Line Material)
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Electric Service Sup. Co.
Electrose Mfg. Co.
General Electric Co.
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Ohio Brass Co.
Westinghouse E. & M. Co.
Insulator Pins
Electric Service Sup. Co.
Hubbard & Co.
Insulators, High Voltage
Lapp Insulator Co.
Insurance, Fire
Marsh & McLennan
Jacks (See also Cranes, Hoists and Lifts
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Electric Service Sup. Co.
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Brill Co., The J. G.
Junction Boxes
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Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
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General Electric Co.
Westinghouse E. & M. Co.
Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.
Lanterns, Classification
Nichols-Lintern Co.
Lightning Protection
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
Line Material (See also Brackets, Insulators, Wires, etc.)
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Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Electric Ry. Equip. Co.
Electrose Mfg. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Locking Spring Boxes
Wharton, Jr., & Co., Wm.
Locomotives, Electric
General Electric Co.
Westinghouse E. & M. Co.
Lubricating Engineers
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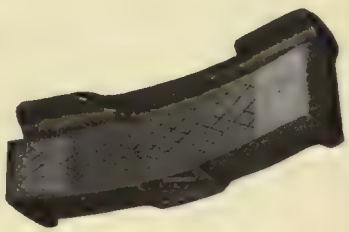
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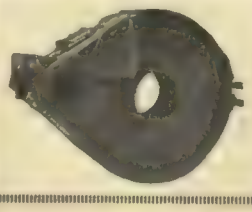
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